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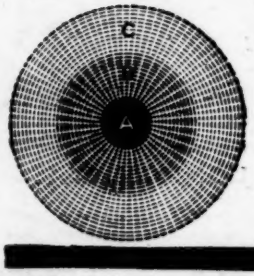


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## An Address
ON
# SURGERY IN THE TREATMENT OF PULMONARY TUBERCULOSIS.*

BY
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SOME twelve to fifteen years ago, and less, remarks on this subject were almost completely confined to pneumothorax. Even with this limitation the audience was apt to look askance at one, and a "sound" physician might show his soundness by asking, "What is the pneumothorax treatment?" or, "What are refills?" To have said at that time much about the further surgical possibilities when artificial pneumothorax failed was to run big risks of being thought so ultraheterodox (one might say mentally aberrant) that one's influence in the teaching of the simpler forms of treatment was likely to be seriously impaired. Nowadays artificial pneumothorax is referred to familiarly as A.P.; in my place the slang term "gassing" is used. Instead, moreover, of having elaborately to expound the principles to general practitioners, patients are sent to one definitely for this treatment.

The other and, if I may use the expression, more definitely surgical methods of treatment are not yet so widely recognized. They are more serious; they are associated with greater risks; and they are still, in this country, far from being widely known, or, when known, approved of. In respect of these operations one is still looked upon with suspicion and even with disapproval, and the making of converts is a slow but very interesting process.

Because of the general knowledge as regards artificial pneumothorax and the less general knowledge about the other surgical methods, I propose to take up the subject at the point where pneumothorax fails to be complete, or fails altogether.

The object of artificial pneumothorax is twofold: (1) to rest the lung; (2) to collapse the lung. The relative importance of these two varies in different cases. If the case is a fairly early one, even if progressive, rest is of more importance than collapse. It is, of course, true that the more complete the collapse the more complete the rest; but it does not follow that, if collapse is partial only, the rest obtained is of small value. In some cases a moderate partial collapse may be of the greatest value. In the more advanced cases, on the other hand, and particularly in chronic cases of long standing in which mechanical changes are well established and dilatation of the bronchi and cavities in the lung parenchyma are important and serious features, the question of rest is of less importance than that of collapse. The collapse, moreover, to be effectual, must be fairly complete so far as the affected parts of the lung are concerned. In haemorrhage, moreover, if the bleeding is to be arrested by the pneumothorax, the collapse must reach and must involve that part of the lung from which the blood is coming. In these cases, again, collapse is more important than rest.

From the above it becomes clear that the presence of adhesions limiting collapse may not be of great seriousness in the treatment of those cases in which rest is the desideratum, but may completely ruin the value of the method in those in which collapse is essential, even though the collapse may be equal to two-thirds of the lung volume. Statistics show, moreover, that the after-results with complete collapse are most strikingly better than those where collapse is partial and is limited by bands and membranes and adherent patches.

Apart from the consideration whether total collapse is necessary or not for the success in the treatment of any particular case, there are certain additional advantages gained by obtaining it. The symptoms are more quickly got rid of; infection (in unilateral cases) ceases to be a constant danger; bleeding is often more completely controlled, and the intervals between refills is longer.

It becomes advisable, therefore, in some cases, and necessary in others, to divide, when practicable, those adhesions which are limiting collapse. The adherence of the surface of the lung to the chest wall may be in the nature of a fusion of the two pleural membranes; it may be by means of a broad membranous sheet allowing but little separation, and often vascular. The adhesions may consist of bands, single or multiple, varying in length and in size from the finest threads to cylindrical or flattened bands up to half an inch across. The larger the adhesion the more likely is it to contain vessels of a size demanding respect in their treatment. These band-like adhesions may be attached to comparatively healthy lung or actually over a cavity. They may have the appearance of starting direct from the surface of the partially flattened lung, or the band may be part fibrous tissue, part lung substance which has been drawn out into a cone. In these cases it is often difficult to say by means of the $x$ rays where lung ends and the adhesion begins, though more possible by the aid of the thoracoscope. Where fusion of the membranes has taken place, division is not practicable; in all other cases division may be possible, but this cannot always be determined until the adhesion has been inspected.

The diagnosis of adhesions between the visceral and the parietal costal pleural membranes is not, in my opinion, possible before a pneumothorax has been attempted; unless it be by pneumograms as suggested by Deist. Adhesions may be suspected as a result of the ordinary clinical and radiological examinations, but that is all. The adherence of the base of the lung to the diaphragm can, on the other hand, be recognized when the dome of the muscle is distorted and flattened. In such cases the dome will show an angle, or even be drawn into a point, midway between the central tendon and the lateral costal attachments; during inspiration some movement of the outer half of the dome will generally accentuate the angular deformity. This type of distortion of the dome is not seen in cases of even extensive shrinkage of the lung if adhesions are absent. It is naturally more frequently observed on the right side.

The division of a single band-like adhesion clearly defined by the $x$ rays as a strand running across the pneumothorax from the partially collapsed lung to the chest wall is comparatively easy with a special long double-edged tenotome passed through an intercostal space, the track having been previously anaesthetized with novocain. This must be done in the $x$-ray room, the patient being placed with the $x$-ray tube behind and the screen in front. When the tenotome has been inserted the $x$ rays are turned on, the tenotome is directed so that the cutting edge of the blade rests on the adhesion, which is then divided by slight sawing movements.

When the adhesion is not so clearly defined, or is large, or is difficult of access, and particularly when there are multiple bands or membranes, or the condition inside the pleural cavity is somewhat obscure, then the thoracoscope will give invaluable aid by enabling very precise knowledge of the state of affairs and relationship and character of the adhesions to be obtained. With the vision obtained through the thoracoscope, moreover, those bands or membranes which are found to be interfering with the collapse can be divided as and where required by the galvano-cautery.

The technique is not particularly difficult, though practice is required in locating the adhesion, in manipulating the thoracoscope with one hand and the cautery with the other, and in deciding on the size of the band—the apparent size varies greatly with the distance from the lens. Fortunately practice need not be at the expense of the patient, as considerable skill can be acquired by manipulating the instruments inside a box across which pieces of string of various size and colour have been rigged. To those acquiring a thoracoscope and cautery I would make one suggestion: if, as in mine, the cautery is turned on and off by a sliding collar on the cautery handle, have this fixed in the "on" position and insert in the flexible wires a contact switch suitable for foot work.

Details of the technique are as follows: The table or bed on which the patient lies must be at a convenient height so

* Delivered before the Yorkshire Tuberculosis Society, October 25th, 1924.

that the surgeon can bend comfortably over the patient, to look down the thoracoscope when it is projecting two to three inches above the chest. It is much easier to look down the thoracoscope when the light in the room is comparatively dim. It is advisable to have a separate battery for both thoracoscope and cautery; it is also wise to have a resistance in each circuit.

The thoracoscope is sterilized by standing it for some minutes in 1 in 20 carbolic acid; all other instruments are boiled. All the instruments should be tested immediately before use. The cautery when hot should give a red glow: if too dark, the charred surface of the adhesion will stick to it; if too bright, bleeding from vessels will not be controlled.

As a general rule it is simpler to insert the thoracoscope through the front of the chest. In this position it is easy to look down it, and while the cautery is being introduced it can be left *in situ*, unattended if necessary, and will retain its position without falling over or dragging on the tissue. The thoracoscope is inserted close to where the adhesion has been localized by the *x* rays; if there are multiple bands, some in the upper and some in the lower part of the thorax, it can be inserted between them. The second or third intercostal space is the commonest site. The cautery is best inserted in the axilla in the fourth or fifth intercostal space. It is easier to work the two instruments if the cautery has to cross the thoracoscope to reach the adhesion.

If the patient is nervous, a third of a grain of omnopon should be given beforehand. The tissues of the chest wall through which the instruments must traverse are infiltrated with an analgesic. I use 2 per cent. novocain and adrenaline for this purpose. I also make a puncture incision in the skin to prevent the instruments dragging through it. Both thoracoscope and cautery are introduced through cannulas which are inserted through the chest wall by means of trocars. The thoracoscope is inserted first and a complete study of the interior of the pleural cavity is made. Then, when the decision as to what adhesions shall be divided has been reached, the trocar and cannula for the cautery is inserted. It is advisable to keep the patient at rest for at least sixty hours after the operation.

When pneumothorax fails entirely or the amount of collapse obtained is insufficient to be effective, local or total collapse of the lung can still be obtained by other means.

### COLLAPSE OF THE BASE.

#### *Phrenicotomy and Evulsion of the Phrenic Nerve.*

If the complete nerve supply to one half of the diaphragm is divided, that dome will not only become paralysed and so be unable to influence expansion of the base of the lung, but it will in addition rise up into the thorax owing to the loss of all muscular tone. The muscle is then influenced by the upward pressure of the abdominal contents and by the intrathoracic pull due to the natural retraction of the elastic tissue in the lung and the contraction of abnormal fibrous tissue. This change of position will produce, or allow, a partial collapse of the lower lobe of the lung. It has been found, moreover (Brunner), that during the ensuing months after the operation the dome of the diaphragm atrophies. This allows of a still further rise, and also, therefore, of a still further collapse. According to Brunner and Felix, the rise of the right dome may be as much as 7.65 cm. and that of the left dome 5.9 cm., while the collapse of the lung may be equal to one-sixth, one-fourth, or even one-third of the volume of the lung. It was to this end that the original operation of phrenicotomy was devised, the nerve being divided as it passed over the scalenus anticus muscle. Results were often disappointing. Sometimes a large phrenic nerve was found and then a fairly complete paralysis and a moderate rise of the dome into the thorax was obtained. Frequently, however, the nerve bundle was small, and little, if any, change was noticed.

The nerve supply to the diaphragm is mainly through the phrenic nerve, which comes from the fourth cervical and occasionally obtains fibres also from the third and fifth cervical. Motor fibres, however, run frequently in a bundle along with the nerve to the subclavius muscle. W. Felix has described a "doubling" of the phrenic nerve; the second bundle of fibres may be 3 cm. distant laterally from those which are taking the normal course. This accessory phrenic he describes as taking the same course in the neck and in close association with the nerve to the subclavius. It passes into the chest superficial to the subclavian vein, and then turns mesially to join the normal phrenic as it lies behind the innominate vein—the two nerves thus forming a loop round the subclavian vein. This arrangement he describes as occurring in 20 to 25 per cent. of cases. The phrenic nerve is joined by fibres from the sympathetic in the lower part of the neck and also from the coeliac ganglion. The twelfth intercostal nerve also supplies fibres direct to the diaphragm, but these are apparently of little consequence.

Two operations have been devised to overcome the disappointments of simple division of the phrenic nerve.

1. *Evulsion of the Phrenic.*—The nerve is exposed in the neck as it courses over the scalenus anticus muscle. It is divided, and a secure hold is taken of the peripheral end. An attempt is then made by steady traction to draw the whole nerve out from the thorax—that is to say, to pluck the nerve out from its insertion into the diaphragm. When successfully accomplished the length of the nerve evulsed will be from 30 to 40 cm. It will, moreover, have been torn away from connecting sympathetic fibres. It will, in addition, bring with it the lower end of the accessory phrenic, when such exists. Great care is required lest the loop formed by the phrenic and the accessory phrenic tear through the subclavian vein. Other risks of the operation are haemorrhage, particularly from the pericardio-phrenic artery and its two attendant veins which run through the thorax in contact with the phrenic. In one case Sauerbruch had to remove two litres of blood from the thorax as a result of laceration of these vessels. There is also the danger of tearing the lung and producing a pneumothorax or pyopneumothorax. In cases where a pyopneumothorax already exists, there is the possibility that the pleura may get torn and the pus escape into the mediastinum. Division of the vagus in mistake for the phrenic, death ensuing, has been described by Ziegler. Failure to evulse the whole of the nerve is not unlikely when inflammatory processes and fibrous tissue formation have taken place at any point along the course of the nerve.

As an alternative to this operation described by Felix, jun., and Lebsche there is—

2. *The Radical Phrenicotomy of Goetze.*—In this operation the phrenic nerve is divided low down in the neck; the sympathetic fibres running to the inferior cervical ganglion are exposed by gentle traction on the phrenic, and are cut, as is the phrenic higher up again on the scalenus anticus; the nerve to the subclavius is also divided where it comes off the upper trunk at the upper and anterior border of the brachial plexus. Both this and the preceding operation are done under local anaesthesia.

The risks associated with the radical operation are theoretically slighter. Actual experience shows, however, that the complications described as peculiar to the first operation occur very infrequently.

Goetze recommends his operation as a substitute for artificial pneumothorax when social reasons make refills impracticable. Sauerbruch, Brunner, and others regard the paralysing of the diaphragm as the operation of choice in cases of tuberculosis of the lower lobe. They advocate it in moderately severe or severe pyrexial cases when pneumothorax has failed; also in advanced but slowly progressive, slightly febrile cases, not entirely unilateral, in which the question of thoracoplasty comes under consideration either because pneumothorax is from the first impracticable, or has been abandoned voluntarily and recurrence has taken place, or been abandoned involuntarily owing to progressive adherence of the pleural membranes. Symptoms may be alleviated in advanced bilateral disease by unilateral paralysis on the more affected side. Haemorrhage has been arrested by this operation. Sauerbruch advises that phrenicotomy should be done as a preliminary to thoracoplasty as a test of the capacity of the other lung to withstand the strain thrown on it by the major operation. To this group of indications I would add intractable vomiting associated with cough in left-sided cases, or in bilateral

cases in which the left side is the more advanced. One other condition is, I have long maintained, an indication for phrenicotomy: I refer to cases of unresolved pneumonia which, unless some such prophylactic measure is taken, are likely sooner or later to lead to bronchiectasis.

The results of phrenicotomy are, in general, considerable reduction of sputum and of cough and lowering of temperature. Complete disappearance of symptoms must not be expected except in those cases where the disease is limited to the lower lobe. Of 60 cases operated on by Sauerbruch, 17 were improved, none were healed. Of 17 cases treated by Goetze, 7 were apparently healed, 9 were improved, and 1 was worse.

### Collapse of the Apex.

#### *Apicolysis.*

This is the brief term which denotes artificial collapse of the upper part of the lung by mesial displacement of it together with the parietal pleura, this layer of pleura having been stripped off the inner surface of the chest and the space thus formed being filled up by some foreign body, such as paraffin, fat, fibroids, muscle, etc.

By this operation a fairly efficient collapse of the apex of the lung down to the third rib in the nipple line can be obtained. The collapse, as in all operations other than pneumothorax, is permanent. The objection to the operation is that it is necessary to introduce a foreign body into the extrapleural space formed by the separation of the lung and the parietal pleura from the deep surface of the ribs—otherwise the lung would at once re-expand. There is possibly also slight risk in the operation of apicolysis that infected matter, squeezed out of the upper lobe, may be inspired into the lower lobe. An attempt to maintain this space by gas has been repeatedly made and found useless, as the gas is too rapidly absorbed. Paraffin is now used by Sauerbruch, Brunner, and others, with varying degrees of success. It has the advantage over living tissue that, when no complications occur, the volume of the paraffin remains unchanged and so also does the extent of the collapse. On the other hand, complications are not infrequent. The paraffin is an irritant and may give rise to an extrapleural effusion. It is extremely difficult to prevent such an effusion from forcing its way to the surface through the wound and causing a fistula, through which the liquid and the paraffin both escape, and which sooner or later becomes infected. Aspiration of the liquid before it has broken down the scar is difficult, as the paraffin blocks the needle. Once the fistula has formed, it becomes necessary to remove the paraffin and to pack the wound with gauze to maintain the collapse of the lung. Portions of two or more ribs may have to be removed later, to assist in maintaining the collapse and in the healing of the wound. Another serious complication is the direct infection of the paraffin-containing cavity from the lung, or the establishment of a communication between this extrapleural cavity and a cavity in the lung substance itself. Baer does the operation through the front of the chest, while Sauerbruch and Brunner recommend the posterior route. In neither case have the results been too encouraging.

Many kinds of tissues have been utilized, particularly by Tuffier, in place of paraffin—lipomata, fibroids, etc.—and with a varying degree of success. Living tissues transplanted into the extrapleural cavity diminish in volume during the first weeks or months. There is a tendency, therefore, for the collapsed apex, together with any contained cavities, partially to re-expand. When fat is used, some of the fat may liquefy: the liquid globules will work their way to the surface, sometimes as long as two months after the operation, causing a rise of temperature, pain, and a red swelling in the region of the wound. If the skin is incised over this swelling, the liquefied fat allowed to escape, and the wound kept aseptic, it will heal; there will, however, have been some loss of tissue and a corresponding re-expansion of lung. I have recently tried to overcome this objection by the use of living pedicle grafts. Briefly, the operation is as follows:

An incision is made over the second costal cartilage and the adjacent part of the second rib. These parts are exposed and excised. The parietal pleura having been laid bare, it is stripped off by the finger from the inner surface of the thorax, laterally, in front, behind, and over the apex. The lung, gently pressed aside with the pleura, collapses mesially and leaves an empty space which must be filled up by the graft. In women the graft consists partly of fat from the front of the chest wall, but mainly, when it is large enough, of the breast tissue on the same side. The fat and breast tissue are stripped up in one long strip which is left hinged along the lower edge of the wound. The lower end of the graft is then lifted up, turned over, and tucked into the cavity, and the rest of the strip pushed in after it. The divided edges of the pectoralis major are sewn over the attached end of the graft and the wound closed.

In men there is usually insufficient fat and there is no breast tissue available. I have, in one case, utilized the pectoral part of the pectoralis major muscle, detaching it from its connexions to the chest wall below the second rib and from its insertion into the humerus. This part of the muscle has constituted the graft which has been tucked into the extrapleural cavity. I have just recently seen this man six months after the operation, and have been very delighted with the efficiency of the collapse and the disappearance of symptoms. There has been complete absence of any untoward result from transplantation of the muscle. I feared lest contractions of the clavicular portions of the muscle should be accompanied by contractions of the graft, and that pain and discomfort would ensue. There has been no discomfort whatever.

The indication for apicolysis is that there is disease mainly localized to the upper lobe, particularly that type of chronic tuberculosis which invades the whole upper lobe and shows little or no tendency to spread beyond, and that type also in which there is cavity formation. If the disease is clearly localized, then I consider the operation to be preferable to attempting to collapse the whole lung by artificial pneumothorax, on the ground that it is not a very serious operation, and, when done, there is no need for constantly recurring treatment, as with pneumothorax. When, however, the localization of the disease is less perfect and there is some invasion of the other lobe or lobes of that lung, apicolysis is indicated only when pneumothorax has been tried and failed and there are reasons against thoracoplasty. Apicolysis is of value also in conjunction with pneumothorax when the upper part of the lung is adherent but the lower part is collapsed by gas.

#### *Results.*

The results of the seven cases on which I have done apicolysis have been as follows:

1. Paraffin replacement for large apical cavity with retention of secretions. Extrapleural effusion with escape of liquid and paraffin. Permanent obliteration of intrapulmonary cavity but persistence of extrapleural empyema, for which further treatment has been refused.
2. Paraffin replacement. Considerable improvement, but the operation was not extensive enough.
3. Fat replacement. Liquefaction of some of the fat. Incision; aseptic healing of the wound and diminution of symptoms.
4. Fat replacement. No complications; considerable improvement.
5. Fat and breast tissue replacement. Very great improvement.
6. Fat and breast tissue replacement. Two months later liquefaction of some of the fat. Patient admitted to another hospital. Abscess diagnosed and treated as such. Readmitted under me. Excision of part of two ribs. Despite this there is considerable diminution of symptoms. Under treatment.
7. Muscle replacement. Result most satisfactory.

### Thoracoplasty.

This is the biggest and the most serious of the operations for the treatment of pulmonary tuberculosis; the results, however, are so good that they fully justify the procedure. It aims at producing almost complete and permanent collapse of the whole lung. The collapse is not so complete as in a perfectly successful case of artificial pneumothorax, but it is superior to that in its influence on the disease, because it is constant. In pneumothorax the degree of collapse varies constantly; it may be complete immediately after a refill has been given, but almost from that moment the lung begins again to expand and expansion continues until the lung is once more suddenly collapsed. With thoracoplasty there is no variation. Pneumothorax enables the lung to heal and when healed it may be allowed once more to function. This is impossible with thoracoplasty; but the type of case selected for this operation has

usually reached that stage at which cavity formation or multiple dilatations of the bronchi make re-expansion, even after a considerable interval, undesirable.

The operation is designed to collapse the whole of the chest wall together with the lung on the affected side. The method of obtaining the result has changed since a decade and a half ago when the Wilms or Brauer-Friedrich operation was in vogue. This change is mainly due to Sauerbruch, who recognized (and put in practice) the importance, above all else, of excision of the posterior parts of the ribs right up to the transverse processes of the vertebrae. Variations of opinion exist as to the number of stages in which the operation should be done—as to the method of anaesthetization, the amount of rib to be removed, and so on—but the essential principle stands.

I cannot discuss the technique here; I hope to publish that in full later. Briefly, the operation entails the removal of portions of the posterior ends of the first ten or eleven ribs through a paravertebral incision. A total of 110 to 140 cm. of bone is removed. The collapse of the chest wall is surprisingly immense, but the actual visible deformity of the patient when dressed and padded somewhat in the axilla is almost *nil*. There is a considerable tendency to scoliosis, but this can be corrected by effort on the part of the patient.

The results on the symptoms are often startling. It is not uncommon to find immediate and complete cessation of all cough and expectoration. One of my patients who had had incessant cough and sputum for two years despite continuous treatment, partly in a Swiss sanatorium and partly in this country, said that the complete disappearance of these symptoms from the time of the operation was alone worth the ordeal. Another, who had his trachea drawn over to the affected side, complained that whenever he coughed his windpipe seemed to vibrate as a tense cord, and that he had the sensation that sooner or later he would suffocate; this sensation disappeared directly after the operation, and this, combined with the cessation of cough and sputum, gave the greatest physical and mental relief.

The operation, as is to be expected, is not always successful; it may be fatal. It must be remembered, however, that most of the cases operated on would almost certainly get progressively worse until they succumbed, and that therefore every case improved or healed is a big gain to set off against those who die. Considering the condition of those who undergo the operation, the mortality ratio is low.

Sauerbruch has operated on 381 cases. The mortality in the first week has been 14 per cent., while 35 per cent. have been practically healed.

Brunner, out of 117 cases, had an 11 per cent. immediate mortality, 22.2 per cent. were improved, and 41.9 per cent. practically healed.

Gravesen, out of 96 cases, had an 8.3 per cent. mortality, while 21.9 per cent. improved, and 44.8 per cent. were much improved or practically healed.

My own figures are much smaller. Out of 25 thoracoplasties done for bronchiectasis and tuberculosis, 20 were for the latter condition. Of these, 7 have become free from symptoms, 5 are considerably improved, while 4, still under treatment, bid fair to come under the "free from symptoms" group. One case died of tuberculous enteritis eleven months after the operation. One case only died immediately after the operation, and that case was complicated by a pyopneumothorax. Previous to the operation on this patient about two pints of pus had to be aspirated every few days.

If the above figures are combined, we have the observation that out of 514 patients who submitted to this operation, 237 derived very considerable benefit from it.

Just as after pneumothorax treatment it is possible in many cases for the patient to return to work, so, too, is it possible for cases who have had thoracoplasty done. But just as it is essential for patients with a pneumothorax to consider their health, be regular in their habits, and careful in their exercise and in the avoidance—if possible—of infections, so, too, is it the case with patients who have undergone the major operation.

Cases suitable for this operation are selected from among those on whom pneumothorax has been tried and has failed *in toto*, or in whom the amount of collapse is inefficient and cannot be improved; also from those on whom a pneumothorax has been done and in whom the lung has re-expanded with return of symptoms and recrudescence of signs. The greatest consideration must be given to the sound side. In my opinion, any evidence of activity in this lung is a contra-indication to operation on the other. This view is not held by all Continental surgeons. Moreover, if, in the past, the less affected lung has been at all extensively implicated—that is, if there has been more than slight scarring or slight root involvement—there is too much danger from the strain that thoracoplasty will throw upon this lung. Slight myocarditis is no bar to the operation; but the presence of additional disease, tuberculous or otherwise, elsewhere than in the larynx, is an absolute contraindication. I have already mentioned that Sauerbruch favours a preliminary phrenicotomy on the affected side as a means of obtaining information as to the ability of the sounder lung to withstand the strain of a complete thoracoplasty.

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# PURULENT PNEUMOCOCCIC PERICARDITIS: PERICARDIOTOMY: RECOVERY.

BY

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THE number of cases in which a purulent pericarditis of pneumococcal origin has been successfully opened and drained is not large. This is not to be wondered at, seeing that the condition is only one item in a serious general infection, and its very presence points to an extension beyond what occurs in most cases. Apart, however, from its interest in this respect, this case is exceptional in the time at which the pericardial infection began.

On September 23rd, 1923, a youth, aged 17, whilst walking in the country was suddenly seized with dizziness and acute pain over the left front of the chest. He had difficulty in getting home. As the pain became more severe he was admitted to hospital on September 25th, the third day of disease. He was then in great distress, and there were signs of pericardial effusion. It was impossible to examine the back of the chest as the slightest attempt at movement caused extreme embarrassment to the breathing, and much distress. He vomited at frequent intervals. He was collapsed and grey with a moist skin. The tongue was furred. There was herpes on the lower lip. His temperature was 102.8°, pulse 120, and respirations 40.

On September 26th he was no better in spite of treatment, and paracentesis was decided upon. The area of cardiac dullness was much increased to both sides. The heart beat could be felt indistinctly, well within the left edge of the dullness, and for a short period a pleuro-pericardial friction sound was heard at the upper part of the left border. When examined again a few hours later it had disappeared.

Paracentesis pericardii was performed (V. T.). The needle was introduced in the fifth space 1½ inches from the sternum, passing backwards, slightly upwards and inwards, and 300 c.cm. of sero-fibrinous straw-coloured fluid were drawn off. This gave immediate relief. After its removal pericardial friction sounds were heard over the upper part of the dullness. The fluid contained many polymorphonuclear leucocytes with Gram-positive diplococci; pneumococci were obtained culturally.

During the next three or four days the temperature fell gradually to normal. He slept well; the breathing, though still frequent, was not distressing. There was no cough or sputum. The herpes became more marked. Occasional pleuro-pericardial friction was heard just inside the left nipple line, also bronchial breathing in the left upper chest in front, and pleural friction in the left axilla. There was also some dullness with diminished breath sounds at the left base behind.

On October 1st, the ninth day of disease, he was listless and apathetic. He was a bad colour, and the pulse remained frequent in spite of the fall of temperature. The liver edge could be felt 1 to 1½ inches below the costal margin, and there was epigastric tenderness. The pericardium was therefore again aspirated, and 200 c.cm. of thin purulent fluid removed. This was again followed by definite pericardial friction sounds. Later in the same day it was decided to drain the pericardium. This was opened (V. T.) under local anaesthesia (alypin), and one inch of the fifth left costal cartilage excised. The internal mammary vessels were retracted inwards, and the pericardium was exposed and incised. A considerable quantity of thin purulent fluid escaped. A drainage tube was inserted, passing behind the heart. After this he improved in his general condition. The pulse came down considerably. He began to eat his food. The wound discharged freely, the pus becoming much thicker. He also developed a cough which caused some pain. In spite of this, however, the temperature, which had been subnormal at the time of the operation, continued the rise which had begun two days after this.

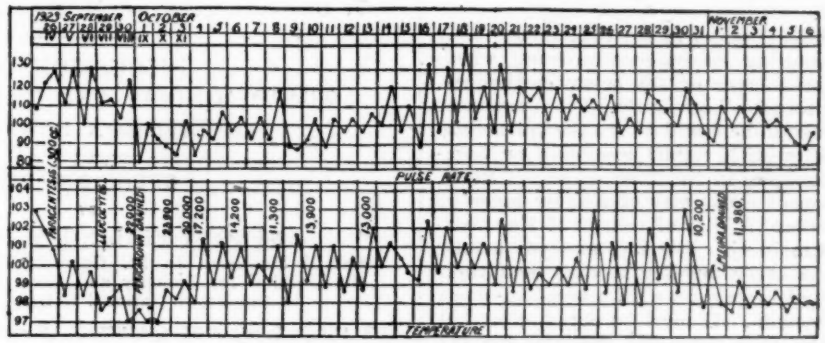

Chart showing pulse rate and temperature.

As the pyrexia continued it was determined to explore the left base, where dullness and diminished breath sounds persisted, and, pus being found, the left pleura was opened and drained on October 31st. The empyema was a very small one. After that the temperature fell to normal and he made a steady recovery. He went out on December 11th apparently in excellent health. The pleura had healed up some time before the pericardium ceased discharging.

At the present time, nearly a year after his attack, he is in robust health. He is able to carry on his work just as before. He plays football without any discomfort whatever. The apex beat is slightly outside the nipple line. The scar, which is about an inch to the right of this, is slightly retracted with each systole, but there is no retraction at the apex. There is no murmur.

As a rule pneumococcal pericarditis is diagnosed, or overlooked, as the case may be, at some time after pulmonary symptoms have established themselves in characteristic fashion. In this case it was fully developed, and causing mechanical distress by the third day. Whether there was also an initial infection of the lungs or not must remain uncertain, but if so it could hardly have preceded the pericardial infection. Neither the temperature nor the general appearance of the patient suggested a pneumococcal infection, although the presence of herpes and the pulse-respiration ratio corresponded to what is seen in a pulmonary infection. There was a striking absence of cough during the first week, and indeed a pneumococcal infection was not suspected until the bacteriological report on the fluid was received.

In a very incomplete reference to the literature no definite case of a primary pneumococcal pericarditis of this severity has been found, or one in which surgical measures have been necessary on the fourth day of infection. Attention has of recent years been called to the possible danger of injury to the left pleura at operation, and Connor[1] reports a case in which this occurred, with the result that an empyema followed, which was not recognized during life, and proved fatal. This may be the explanation of the empyema in our case, but on the other hand the presence of pleuro-pericardial friction on the left side prior to the first paracentesis shows that this pleura had not altogether escaped early infection.

There is a tendency in the literature to depreciate the value of paracentesis in cases of pericardial effusion, many surgeons preferring the operation of pericardiotomy on account of possible injury to the heart or coronary vessels caused by the needle, but if a diagnosis of pericarditis with effusion is correct there should be little risk. Paracentesis is easy and quick, and relief, when the fluid has been drawn off, is immediate; the operation of draining the pericardium can then be carried out in more favourable circumstances. This was the procedure adopted in our case. The oblique sinus was not drained, as recommended by Ballance, and yet there was a complete recovery. Possibly there is less necessity for drainage of this space in cases met with in civilian practice than in those occurring as a result of war wounds. In support of this view one may instance the comparative success of arthrotomy for septic infections in civil practice, when compared with the unfavourable result of this operation in joint infections met with in war wounds.

REFERENCE.
[1] Connor: *Medical Record*, 1900, 77.

# EARLY PREGNANCY AND EPITHELIOMATA.

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Do the conditions prevailing in the first three months of pregnancy assist in a study of the etiology and treatment of epitheliomata? It is in the hope of eliciting an answer to this question, or at any rate of inducing others to consider the suggestion contained therein, that I have written the following notes.

It has always seemed to me that a clue to the cause and treatment of epitheliomata through the conditions to be found in early pregnancy has never been given the care and thought to which it is entitled. There is no other normal condition in which one tissue, if it does not definitely attack, at least invades another, so that unless every possible clue fails we ought not easily to be turned aside and pronounce it a "blind."

The fundamental point to be kept in view in a study of any disease is that the normal human body is fully equipped to withstand disease, and it should be our duty to find out, in the first instance, why its resistance fails—not the nature of the attacking force. Remember that the tissues are fully equipped at the start, therefore the weakness is on their side. Working from this standpoint, we would have to allow that the body tissues are prepared to, and normally can, resist the growth of an epithelioma, and that if the tissues are prepared against this particular growth they will resist any invading growth, whether malignant or not. This leads me to suggest that, as a result of this preparedness, the body will resist the normal invasion of the chorionic epithelium. The chorionic villi are able to invade the uterine wall, and so in some way this resistance has been overcome—but how? That the body shows signs of a reaction taking place is evidenced by the general malaise, nutritional disturbances, and sickness of pregnancy. We also know that lutein cells have appeared in the ovary after the ovum left it and these cells seem to grow in proportion to the rate of growth of the placenta, and that when the placenta ceases to grow, at the third month, these lutein cells also cease to grow. That there is some connexion between these two points is admitted. It is also generally admitted to-day that the function of the corpus luteum is that of an internal secreting gland. When Fränkel found that destruction of the corpus luteum in pregnant rabbits resulted in abortion, he concluded that it produced a secretion which maintained the implantation and growth of the ovum *in utero*. I suggest that this might be modified by saying that the secretion produces a body reaction, the result of which is to provide an antibody to the normal "body resistance to any invasion," and so the chorionic epithelium is able to maintain its hold, and that Fränkel's experiment allowed the normal body resistance full play so that the chorionic epithelium was repelled.

Pregnancy sickness is evidence of this auto-inoculation. This also explains the abnormal lutein activity found in

chorionic epithelioma. Overproduction of secretion results in completely antidoting resistance, and so invasion continues wildly. Underaction or inaction is a cause of sterility. Further, the action of lutein secretion in lowering or countering body resistance explains the preponderance in women of cancer cases under the age of 40, as compared with men under that age. The body must be primarily regarded as fully equipped, yet there is a weakness here and a clue to general resistance may follow deduction. The epithelioid character of the lutein cells and the fact that they contain a lipoid substance is important when we remember that the body is prepared to resist an attack by epithelial cells. My meaning, however, will be clearer if I diverge for a moment.

It seems a very important point to me that in the body generally we do not find an epithelioma growing where there is an unadulterated layer of fat below epithelium. I use the word "unadulterated" advisedly. The commonest sites for epitheliomata are to be found where the epithelium comes into direct contact with mixed muscular or fibromuscular tissue—for example, in lip, tongue, cervix uteri, and following dissolution of continuity of a fatty layer by wounds, ulcers, burns, etc. A case of cancer of the abdominal wall would be rare in this country, and yet among the women in India who carry burning incense next their abdominal skin, and so get large sores with a breaking down of the fat layer, it is common. It must be noted, too, that the only area which the body normally prepares for the reception of invading cells (chorionic epithelium) does not possess a fat layer. *Fat, therefore, is protective.* Muscular tissue, especially mixed muscular and fibrous tissue, has some property which makes it a very receptive medium for proliferating epithelium.

That epithelial and lipoid substances come so much into evidence in early pregnancy and produce some form of reaction on the part of the body, and that the fat of the body ordinarily exercises a protective action, are very important points. When I refer to "unadulterated" fat I mean fat which is not interlaced with elements such as I have said form suitable receptive media—for example, in the breasts. The action of fat may be purely mechanical: it may act as a protective blanket—we have evidence of germs taking advantage of this in the fatty envelope of the tubercle bacillus; and, to digress again, a method of attack on this envelope, preparatory to antituberculous treatment, is here indicated—but the close relationship of fat and epithelium in the body generally and the epithelial and lipoid nature of the lutein cells suggests that either fat alone, or some interaction between the two, provides the blood with its resisting powers; or, again, that the fat in itself provides both mechanical protection and the resisting powers to the blood normally, and that, in a finer and more intimate form, in the lutein cell epithelial and lipoid substances evolve an antidote to that resistance.

I do not think that impregnation of the ovum by the spermatozoön and subsequent events are in any way analogous to a proliferating epithelial cell, as I have seen suggested. An analogy would require the production of innumerable ova, *not* the much more highly specialized and complex result we get. The "microbe" is the epithelial cell itself, and its proliferation is the result of one of known methods. If, while proliferating, this cell is in contact with mixed muscular tissue, it is in contact with a new food, and sometimes intensive cultivation results. The epithelial cell, like any other living entity, will go in search of nourishing food, and, finding it, will greedily absorb it. This food being a vital constituent of muscle food, starvation and exhaustion result, with subsequent death.

The preventive treatment of cancer is of extreme importance, and is along the lines of greater internal and external body hygiene. An impaired drainage system must result in a lessened vitality of the body cells, and consequently impaired functional and resisting activity. Further treatment would follow a closer study of the exact uses of fat and isolation of the agent capable of producing increased body resistance, in conjunction with early diagnosis and its use after operation.

In conclusion, then, my answer to the question at the beginning of this paper would be in the affirmative.

# British Medical Association.

## *PROCEEDINGS OF SECTIONS AT THE ANNUAL MEETING, BRADFORD, 1924.*

## SECTION OF NEUROLOGY AND PSYCHOLOGICAL MEDICINE.

T. GRAINGER STEWART, M.D., F.R.C.P., President.

## DISCUSSION ON THE DIAGNOSIS AND TREATMENT OF COMPRESSION PARAPLEGIA.

### OPENING PAPER

BY

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THE subject for our discussion to-day, the diagnosis and treatment of compression paraplegia, is one which must appeal to the general practitioner as well as to the neurologist and the surgeon. Any form of paraplegia which is amenable to surgical intervention demands careful attention, and an early and accurate diagnosis is an essential preliminary to successful treatment.

We must first define what we mean by the term "compression paraplegia." For the purpose of this discussion I will define it as follows: "A pathological condition where a localized lesion causes pressure either on the whole contents of the spinal theca or on the spinal cord alone, with or without involvement of the nerve roots, in such a way that the functions of the spinal cord become progressively damaged."

In order to keep this subject within reasonable limits I am deliberately excluding from consideration cases of sudden or acute lesions of the spinal cord, caused by trauma or acute myelitis of any kind.

It is not of academic interest only to pause for a moment and inquire exactly how the functions of the spinal cord suffer—that is, how the symptoms are produced. For symptoms will often, indeed generally, arise some time before the cord is actually mechanically compressed or squeezed. The conditions are very different from those obtaining in, say, cases of gunshot wounds of the cord, with suddenly produced lesions which may entirely destroy the cord over one limited area. Here the interruption of function is complete physiologically and often anatomically as well. Ascending and descending degeneration of nerve tracts follow, and subsequent recovery depends primarily on the extent to which such secondary degenerations have occurred. But the morbid anatomy, as well as the conditions found at operations during life, show very conclusively that no such complete anatomical lesions exist in the majority of cases of compression parapiegia. Witness also the recovery, often complete recovery, which may take place after a successful intervention.

Microscopic examinations again demonstrate the exceedingly small amount of secondary degeneration which may be found even in cases which have shown a complete paralysis during life. Obviously, therefore, some factor must be at work other than the mere mechanical destruction of nervous tissues. This factor is almost certainly interference with the circulation in the cord. Probably the veins suffer first in most cases, with the production of a state of venous congestion. Later the arteries suffer, and an ischaemia or anaemia of the cord occurs, which, though insufficient to cause permanent degenerative changes, is yet enough to produce very considerable, even complete, temporary loss of function.

There is yet another factor to be considered, and one which is sometimes of great importance. This is the fluid

pressure exerted by a collection of cerebro-spinal fluid, encysted or at any rate dammed up by chronic adhesive meningitis, or sometimes caused by blocking of the circulation of the fluid in the subarachnoid space by a tumour within the dural envelope.

Now what are the possible causes of compression paraplegia, using that term in the sense which I have defined already? We may attempt a classification as follows:

*Extrathecal Lesions.*

A. Diseases of the bones.
   1. Pott's disease.
   2. Caries sicca.
   3. Tumours—(*a*) primary, (*b*) secondary.
   4. Spondylitis deformans.
   5. Osteitis deformans.

B. Extrathecal lesions other than diseases of the bones.
   1. Aneurysms of the aorta.
   2. Parasitic cysts.
   3. Tumours arising in the perithecal tissues—for example, sarcomata.

*Intrathecal Lesions.*

1. Tumours—
   (*a*) Extramedullary: Fibromata, sarcomata, endothelioma, psammoma, myxoma, or haemangioma.
   (*b*) Intramedullary tumours.
2. Chronic meningitis:
   (*a*) Pachymeningitis.
   (*b*) Meningitis serosa circumscripta.

The general signs and symptoms are best considered under two heads: first, those due to the direct effect of the lesion on the spinal cord and nerve roots at some particular level; and secondly, those due to interruption of the functions of the long ascending and descending tracts in the cord. We may use the terms "local" and "remote" to designate the two groups of symptoms.

The local symptoms are due to involvement of the nerve roots and some particular segment or segments of the cord. Of these local symptoms those due to affections of the nerve roots, both posterior and anterior, are often the more important, as they may constitute the earliest symptoms; and of these the symptoms referred to the posterior roots are the more constant. Pains localized to the area of supply of the roots involved are a very common and characteristic feature, and may precede for some time any signs of pressure on the cord itself. Usually more or less constant, these pains are subject to paroxysmal attacks of increased violence often induced by movements or by such a common and simple act as coughing or sneezing. If the dorsal roots are involved on both sides a well marked girdle sensation may be present. Associated with the pains sometimes is hyperaesthesia or hyperalgesia (better perhaps termed over-reaction) in the same area, and this condition may be followed later by a loss of sensation even when the pains persist—an example of the so-called anaesthesia dolorosa. The existence of these root pains has a great practical importance, for it is not very uncommon to see a patient in whom useless operations have been performed for the relief of supposed renal calculi or appendicitis when a careful examination of the nervous system might have avoided this calamity.

It is less common on the whole to find symptoms specifically referred to the anterior roots. When present these consist in localized muscular atrophies or paresis with loss of the corresponding reflexes. Occasionally involuntary muscular spasms may precede such wasting or weakness of muscles. Such signs are generally best seen in cases of disease of the cervical region of the cord, for the changes are then easily studied in the musculature of the hands and arms. The local symptoms referable to the spinal cord may be as follows: (1) On the motor side, localized muscular atrophies and paresis with loss of tendon reflexes and sometimes vasomotor and trophic changes. (2) Sensory symptoms; these may consist in a loss or diminution in sensibility confined to the particular distribution of the affected segment or segments; this sensory change may be of the so-called dissociated type, so typically observed in syringomyelia. When a loss of sensation is present below the level of the lesion it may be difficult to separate the exact limits of the two areas of sensory impairment.

Of greater interest is the occasional presence of pains referred to parts below the apparent site of the lesion—for example, pains in the legs in the case of a compression of the dorsal region of the cord. This condition has been the subject of a good deal of comment recently, being entitled "pains of central origin," but its occurrence was clearly pointed out by Horsley as long ago as 1911.

The remote symptoms—that is, those due to interference with the conduction of the nervous impulses in the long tracts of the cord—may be considered under three heads: (1) motor, (2) sensory, and (3) autonomic.

The motor symptoms consist, first, in a loss of voluntary power. This may vary from a slight weakness to a complete loss of all power. It is usually first apparent in the more distal parts of the limbs and affects the flexor muscles more than the extensors, a loss of power of dorsiflexion of the feet being one of the earliest signs. Severe ataxia or inco-ordination is not as a rule found when enough voluntary power is present to test the movements. The loss of power is generally gradual and progressive, but occasionally a very rapid paraplegia sets in, notably in certain cases of Pott's disease, where a complete paraplegia may sometimes be attained in as short a time as twenty-four hours. Under a discussion of the motor symptoms must be included the state of tone of the muscles of the limbs—a point of great interest and importance.

The commonest picture is what is known as a spastic paraplegia in extension. The legs gradually become stiff, this stiffness, spasticity, or increase in tone affecting the extensor muscles of the lower limbs more than the flexors; hence the legs will be rigidly extended at the hip- and knee-joints, with plantar flexion of the feet, it being remembered that the calf muscles are physiologically to be regarded as extensors. This increase in tone of the extensors may be so extreme as to render even forcible flexion of the limbs a matter of some effort. As compression increases and the functions of the cord become progressively impaired, this spastic paraplegia in extension may be seen to pass gradually into a spastic paraplegia in flexion, with the limbs flexed at all joints.

An earlier stage of this condition is the occurrence of those painful flexor and adductor spasms which may constitute an annoying and even distressing symptom. The gradual passage, therefore, of a case from one of spastic paraplegia in extension to one in flexion must be held to be a sign of ill omen.

A flaccid paraplegia in cases of compression of the cord is far less often seen. It may, however, occur as one of two varieties: (1) as the final stage of a complete compression where all physiological continuity in the cord is broken, and (2) exceptionally as an initial and sometimes temporary state. In this second form it may herald the appearance of a rapidly fatal compression, or it may be followed by improvement with the change to a spastic state. With this early flaccidity an acute or rapidly produced lesion is present.

Alterations in the reflexes are the next item for consideration under the head of motor symptoms. These alterations may be rapidly summed up as follows: Exaggeration of the tendon reflexes, often with clonus, a loss of the normal superficial reflexes, and the appearance of certain new forms of reflex activity. Thus the knee-jerks and the ankle-jerks will be exaggerated, often with patellar or ankle clonus; the abdominal and cremasteric reflexes will be lost if the lesion lies above the level of their reflex arc in the cord. The normal plantar flexor response is replaced by the so-called extensor response or sign of Babinski. Associated with this (Babinski's sign) is the "flexion reflex," which consists in a movement of flexion of the whole limb. This may be seen to occur in a rudimentary form in the shape of the contraction of the flexors of the thigh even when this contraction is insufficient to move the knee-joint appreciably. This reflex flexion movement is best elicited by some slightly nocuous stimulus, such as dragging a pin along the outer part of the sole of the foot. Indeed, Babinski's sign is only part of the general flexion movement. As compression increases, the reflex excitability of the lower limbs becomes increased and the threshold of stimulation necessary to produce this flexion reflex is lowered; at the

same time the field from which it is possible to excite the reflex is enlarged. Hence the frequent and irritating flexor movements or flexor spasms to which attention has already been directed, and which in severe cases may be produced by almost any handling of the lower limbs.

In those more rare cases where the paraplegia has finally become flaccid, or where it has been flaccid from the first from the initial spinal shock, all reflex activity below the lesion is entirely abolished. A useful generalization, however, emerges from what has been said on this question of the changes in tone and in the reflexes. It is this: a change from a spastic paraplegia in extension with exaggeration of the tendon reflexes to a state of flaccidity with great diminution or a loss in the tendon reflexes is a sign of grave import, indicating a progressive loss in the functions of the cord; whereas a change from an initial flaccidity to one of spasticity in extension with exaggeration of the reflexes is, on the other hand, a favourable sign.

We must now consider the remote sensory symptoms. It is a general rule that loss of sensation appears later than loss of motor power. At first the feet and legs are affected most and the loss becomes less marked and less absolute higher up; thus in a lesion at the mid-dorsal level, for example, the sensibility above the thighs may be practically unimpaired. Complete loss of all forms of sensation is relatively less common, except in the later stages of the disease. A distinct dissociation of sensation may be found in some cases. Generally the senses of position and passive movement and the vibration sense are affected before pain and temperature, and sensibility of light touch is usually the last to go. Occasionally there is a relative preservation of sensation in the lower sacral segments when the loss is complete in all higher segments. Unless a complete loss be present, a distinct variability both in the exact level and in the degrees of the loss is not uncommonly found, especially if the lesion causing the compression is diffuse and extends widely in a longitudinal direction.

This general sketch of the symptoms applies to cases where the compression has been exercised on the whole cord more or less evenly. Obviously there are many cases, and especially cases of intradural tumour, where the pressure is exerted at first on one side of the cord only, with the production of either unilateral symptoms or a more or less characteristic Brown-Séquard syndrome.

The last division of the remote symptoms which remains to be considered is the affection of the autonomic system especially in relation to bladder and rectum, of the practical importance of which I need hardly remind you. If the damage to the cord occurs above the lumbar and sacral regions and the roots of the cauda equina are not affected, the earliest bladder symptoms to occur are a difficulty in beginning the act of micturition; in most cases this soon gives way to retention of urine, which, indeed, not infrequently occurs quite suddenly. If such retention be not relieved by the passage of a catheter or by suprapubic drainage overdistension of the bladder takes place, the sphincter relaxes from time to time, and dribbling of urine occurs. If, however, overdistension be prevented, a certain amount of automatic action of the bladder may be expected to develop. This will as a rule only occur in cases where the compression has been of gradual onset and where the functions of the cord have not been unfavourably influenced by the presence of urinary infection or bedsores. Such automatic action may result in the involuntary discharge of urine at varying intervals. Should the lesion be low down in the spinal canal and affect either the sacral segments of the cord or the roots of the cauda equina, the parasympathetic supply of the bladder will be interfered with, and, as a rule, instead of retention with possible later automatic action the sphincter of the bladder becomes paralysed and persistent dribbling of urine results. In some instances even here a periodic reflex micturition is developed.

The functions of the sphincter of the rectum are generally affected at the same time as the bladder. Obstinate and increasing constipation is the rule, and when this is relieved by aperients or enemata control over the subsequent evacuation is lost. Should the lesion involve the origin of the sympathetic nerve supply of the small intestine or the parasympathetic outflow for the innervation of the lower bowel, a paralytic distension of the abdomen may result—a condition which may be aggravated by the weakness or absolute paralysis of the muscles of the abdominal wall. In severe lesions affecting the sacral segments the sphincter of the rectum may be completely paralysed.

Other groups of symptoms coming under the head of the autonomic system are (*a*) vasomotor changes, (*b*) abnormalities of sweat secretion, (*c*) trophic lesions, and (*d*) finally, alterations in the functions of the pilomotor centres. Time will only allow me to refer very briefly to this interesting series of changes.

Abnormal vaso-constriction may be evident in an unusual pallor and coldness of the paralysed limbs; vaso-dilatation by some swelling or blushing of the skin, which is generally seen in the more acute cases. The anomalies of sweat secretion usually consist in a tendency to hypersecretion in the paralysed parts; the level of the lesion in the cord has in some instances been demonstrated by the injection of pilocarpine. Head and Riddoch have further demonstrated an excessive sweating as occurring as part of the fully developed flexion reflex or mass reflex in cases of severe injury to the cord, where the lower part of the cord below the lesion has taken on an increased reflex excitability. Trophic lesions in the shape of bedsores are, unfortunately, only too familiar a symptom, which needs no description. As a rule the more severe the compression the greater the liability to bedsores, and often one of the earliest results of a successful intervention is the healing of a sore.

With the foregoing sketch of the general features of compression paraplegia in our minds it will be convenient now to describe briefly the peculiarities of some of the more important forms of the disease—and Pott's disease of the spine, or spinal caries, claims first attention, as being the commonest form of compression paraplegia. About 5 per cent. of all cases show spinal cord symptoms, which may occur at any age, and it is important to note that nervous symptoms may appear before any disease of the vertebral column has been suspected. The cord may be injured in one of several ways—by pressure from an abscess, by the growth of tuberculous granulation tissue interfering with the circulation in the cord, by the formation of a dense chronic pachymeningitis, and finally, though very rarely, by the direct pressure of a displaced fragment of bone.

With regard to these different forms of lesions in Pott's disease, Sorrel and Sorrel-Déjerine have lately pointed out that the form of paraplegia due to the pressure of an abscess tends to appear earlier, becomes more rapidly complete, and is attended with a better prognosis, while that due to a pachymeningitis appears more slowly, is progressive, and is ultimately the more incurable lesion. In the majority of cases the onset is gradual and the compression progressive up to a certain point, but occasionally, and especially in elderly people, a complete paraplegia may set in quite suddenly. In the slighter cases nothing may be noted beyond a slight weakness of the legs with perhaps some spasticity, increased tendon reflexes, and extensor plantar responses. In more severe cases a typical paraplegia in extension will be found. Root pains are not as a rule present; the loss of sensation is generally not extreme is often variable in degree, while its upper limit is characteristically fugitive and difficult to estimate accurately. Exceptionally the paraplegia is flaccid from the beginning; in these cases the paralysis is usually of rapid onset and the prognosis grave.

The next form of compression paraplegia to which I would make especial reference is that produced by spinal tumours. Setting aside secondary tumours of the vertebral column, the commonest form of tumour is the intrathecal and extramedullary tumour, which arises inside the dural envelope, often in connexion with a nerve root, and exercises pressure on the cord over a particular segment or segments. This is a lesion which is essentially amenable to cure by surgery, provided the diagnosis has been made sufficiently early. Experience has taught me that the incidence of such tumours is much underestimated by the profession at large. Many cases are allowed to drift into incurable and hopeless paraplegia for lack of an early diagnosis. The only reason for this condition appears to be

a lack of appreciation of the possible existence of such a lesion.

The clinical picture of these extramedullary tumours is that of a "slowly progressive spastic paraplegia, with clearly defined sensory loss, often preceded or accompanied by well marked root symptoms and not infrequently with a tendency to the development of the Brown-Séquard syndrome" (Foix). In its most typical form the history of these cases is divided into three chapters: First, a period characterized by root pains, often severe and paroxysmal; it is at this stage that the disease is most likely to be confused with quite different conditions, such as angina pectoris or renal calculus, and various futile operations performed. Secondly, a period where weakness of one or of both lower limbs appears, accompanied by disturbances of sensation or the Brown-Séquard syndrome. Thirdly, a complete spastic paraplegia.

I have already alluded to the character of these root pains, and will say no more about them now except to emphasize the importance of keeping in mind the possibility of the existence of a spinal tumour when pains of this kind are complained of. The exact distribution of these pains is, of course, often of great value in the topographical diagnosis of the lesion. The symptoms produced by pressure of the tumour on the cord will follow more or less closely the description already given of compression in general. But the frequency of a predominantly unilateral motor weakness with objective sensory loss mainly on the opposite side of the body (the Brown-Séquard syndrome) is sometimes a characteristic feature. In the earlier stages the objective loss of sensibility is apt to be more of the dissociated type where the sensations of pain and temperature are affected more than the sensation of light touch. With the advance of the compression a typical spastic paraplegia in extension becomes evident, generally with great exaggeration of the tendon reflexes and a well marked flexion reflex as already described.

In cases of long standing there are certain features in the disturbances of sensation which are worth remarking. Besides the root symptoms the objective loss of sensation is generally very definite, and extends to a perfectly well defined level. At the upper border of this level of altered sensation there may often be found a zone of hyperaesthesia or a band where all forms of sensation are completely lost. Even in severe cases it is to be noted that the sensibility in the sacral segments of the cord tends to be relatively less affected. In these cases of extramedullary tumours a steady progress in the symptoms is the rule, though signs of complete compression may be delayed for many months, even years. The actual nature of the tumour does not influence the variety or the course of the symptoms as much as its position—whether anterior or posterior to the cord or on its lateral aspect—except in so far as a rapidly growing tumour will obviously produce symptoms more rapidly.

Much of my time has necessarily been occupied by a consideration of the signs and symptoms to be found in any case of compression paraplegia. I have also discussed quite briefly the typical features of two special forms of this disease—spinal caries and extramedullary tumours. I hope, therefore, that it is not necessary to enter deeply into the question as to whether in any given case a compression lesion is present or not. There are, however, certain diseases which may simulate a compression paraplegia very closely. These are spinal syphilis, disseminated sclerosis, and syringomyelia. A chronic syphilitic meningomyelitis may give very much the same clinical picture as we have described; indeed, there may actually be a certain amount of compression present from meningeal thickening. Examination of the blood and of the cerebral-spinal fluid may be needed to settle this point. But it may be mentioned that a positive Wassermann reaction in the blood does not negative the existence of a spinal tumour, and a positive reaction in the spinal fluid has also been found in some cases of spinal tumour.

There are, however, other changes in the spinal fluid which are very typical of spinal compression of which an account will shortly follow. Clinically, signs elsewhere in the nervous system, and especially changes in the pupils or cranial nerves, would naturally speak for syphilis and against tumour. It is, however, in certain cases of disseminated sclerosis that the greatest difficulty may arise. Examples of the so-called spinal type of disseminated sclerosis with a spastic paraplegia and perhaps a little loss of sensation confined to the periphery of the legs do certainly exist, but it is wise not to be content too easily with this diagnosis. In coming to a conclusion due weight must be given to the history, to the presence or absence of remissions or relapses, and to any affection of the cranial nerves, and especially of the eyes; and nystagmus alone cannot be accepted as conclusive evidence of disseminated sclerosis, for it has been found in lesions of the cervical part of the cord of many different kinds. On the other hand, root pains with a steady progress in the symptoms unrelieved by any remissions speak more strongly for a compression.

Syringomyelia, though it may simulate a compression lesion in the cervical region, may generally be distinguished by the marked and persistent dissociation of sensation, by its extreme chronicity, and by the late affection of the sphincters. It is with greater difficulty separated from an intramedullary tumour, with which, indeed, it is often practically identical in its nature and effects. The final diagnostic test is afforded by lumbar puncture and examination of the cerebro-spinal fluid. This is so important an aid that its use should on no account be omitted in any case where the slightest doubt exists.

If we have excluded any general disease of the nervous system and have arrived at a definite diagnosis of a local lesion, two important questions then remain to be answered—the nature and the site of the lesion. In considering the nature of the lesion our first step is to discover whether it is a disease of the bones of the vertebral column or, if not, whether it is within or without the thecal sac. Due regard must be paid to the history of the illness as well as to the results of the clinical examination. This last must be very complete, and besides the ordinary neurological examination must include a careful examination of the spine, an examination of all the bodily systems, not forgetting the possible presence of some such lesion as an aneurysm of the aorta, and especially the possibility of a vertebral lesion being due to a secondary deposit of malignant disease; a careful search for the presence of a primary growth must therefore often be made. *X*-ray examination of the spinal column is imperative, and may be combined, as will be described later, with the method of injection of lipiodol into the theca.

The very important point of lumbar puncture and examination of the cerebro-spinal fluid must now be considered. The changes occurring in the fluid in compression of the cord are often highly characteristic and may afford conclusive evidence of a block in the free circulation of the fluid in the spinal subarachnoid space. Since Froin described a condition where the cerebro-spinal fluid was coloured yellow and clotted spontaneously on standing much has been written on this subject. I can here only summarize the conclusions which we can draw from recent work. One of two characteristic changes or series of changes is to be found in the fluid as withdrawn from the subarachnoid space below the site of the compression. First, the fluid may be, as normally, colourless, but contains a great excess of protein without any excess of cells—a condition to which the French have given the name of "dissociation albuminocytologique." And secondly, and more rarely, the syndrome proper of Froin may be present, where a yellow or golden brown colour of the fluid may be noted (xanthochromia), with a tendency to spontaneous and massive coagulation of the fluid, this coagulation taking place very rapidly after withdrawal. The first of these changes, the increased protein content, is certainly an earlier occurrence than the latter, which is not always found even in cases of severe or complete compression. Indeed, the estimation of the protein content of the fluid may be said to give a good index of the severity of the compression. Bearing in mind the normal figures of the albumin content—namely, from 0.025 to 0.04 per cent.—we can attach importance to figures of over 0.1 per cent., which are by no means uncommon; indeed, figures of 1 per

cent. have been recorded. These changes are only found in the fluid below the compression, a fact which has led to the discovery of the value of a double puncture in some cases—one in the lumbar sac at the usual site, and the other above the supposed site of the lesion, usually in the cisterna magna through the occipito-atlantal ligament, after the method introduced by Ayer. An interesting comparison can then be made between the two fluids and definite confirmatory evidence of compression obtained.

Recently Sicard has introduced a new method of radiological diagnosis which is useful in determining the presence or not of a block in the subarachnoid space, and secondly, its exact situation and magnitude. This consists in the injection into the cisterna magna of a substance called lipiodol, a vegetable oil containing 40 per cent. of iodine, which is very opaque to the *x* rays. The lipiodol is very heavy and in a normal subject sinks rapidly to the bottom of the theca, where it is clearly demonstrated by *x*-ray examination. If a block be present the lipiodol will be arrested for a varying time at the level of the block; hence the upper limit of the block may thus be clearly defined. By injecting the lipiodol into the lumbar sac and inverting the patient the lower limit of the block may be similarly shown. I will leave it to other speakers to discuss the exact details of this procedure and will only emphasize the value of this method, especially in cases where the topographical diagnosis of the lesion is not definite by neurological tests alone. It is well to add a word of warning that cistern punctures should not be undertaken without preliminary practice on the cadaver. In the majority of cases a careful neurological examination is sufficient to establish an accurate diagnosis of the level of the lesion, in arriving at which the following considerations may be borne in mind.

Localized root symptoms have a decided value, whether they consist of pains, of anaesthesia, or of localized muscular atrophies. But in the majority of cases the topographical diagnosis rests in the main on the exact distribution of the sensory loss. The value of this depends very much on whether a clear and definite upper level of altered sensation can be elicited. If this is present a good localization can be established. If, however, the upper level of the sensory loss gradually shades off into an area where sensation is only partially lost—a hypaesthesia—an exact diagnosis becomes more difficult. In such cases the border between the absolute loss and the partial loss is usually taken as the level of the lesion. Some observers place greater reliance on the level of the loss of temperature sense. Occasionally it is possible to distinguish a zone of hyperaesthesia abutting on the upper level of the sensory loss. If so, this has a localizing value.

It is less common for a topographical diagnosis to be possible from the motor symptoms. In lesions of the cervical part of the cord, however, muscular atrophies in the hands or arms or in the muscles of the shoulder girdle may afford exact information, as may also the results of electrical examination of the muscles. A careful examination of the tendon reflexes in the arms particularly is often of great value, for these will be normal above the lesion, abolished at the level of the lesion, and exaggerated below the lesion. A knowledge, therefore, of the segmental representation of the reflex in the cord is essential, though this can always be verified by reference to a textbook. In lesions in the dorsal regions differences in the upper and lower abdominal reflexes and between the power in the upper and lower segments of the recti muscles have an obvious localizing value.

There are many points of detail in the diagnosis of the nature, the extent, and the site of the lesion which could be elaborated in far greater detail than I have attempted. I hope that other speakers will complete these gaps in my remarks and will deal more specifically with treatment, which is essentially a surgical problem.

May I, finally, be allowed to repeat my conviction that many cases of chronic compression of the spinal cord go unrecognized until it is perhaps too late to achieve a cure or even much improvement? For this reason alone our subject demands close and careful investigation.

## GENERAL DISCUSSION.

Dr. HILDRED CARLILL (London) supplemented Dr. Feiling's paper with some remarks based upon his own experience. The special interest of compression paraplegia at the moment was due to the recent introduction of methods which facilitated the determination of the upper and lower levels of the compressing agent, and in some cases its nature. A fracture of the spine, notably in the cervical and lumbar region, might occur without causing cord compression. Fracture-dislocation might be present without impairing the palpable outline of the spinal column. In many cases of traumatic cord compression there were obvious reasons by which the level of the cord injury might be diagnosed. A photograph of a case was shown illustrating the attitude characteristic of a lesion directly below the sixth cervical segment: in addition to the segmental distribution of sensory loss, the pectorals, triceps, forearm and hand muscles, abdominal muscles, and lower limbs were paralysed. On the other hand, certain muscles of the upper limbs, notably the biceps, supinators, and deltoids, were not only not paralysed but were in a state of contraction from irritation of the fifth and sixth cervical spinal roots directly above the lesion. In the photograph, the upper limbs were seen abducted and flexed at the elbows, the intercostals were paralysed, respiration depending on the diaphragm alone. A colleague had found a fracture-dislocation between the seventh cervical and first dorsal vertebrae.

Sometimes in affections of the upper two dorsal segments, and indeed throughout the cervical cord, they might find ocular evidence of sympathetic palsy. Similarly in the dorsal cord, the lumbar enlargement, the sacral region, and in the conus and cauda equina, a compressing lesion usually gave specific evidence of its regional distribution. Vasomotor disturbance was common in lesions of the dorsal cord. Priapism was often quoted as a feature of cervical cord lesions, but it occurred frequently with lesions of the dorsal cord, and was ascribed by Kocker to vasomotor disturbance. Of four cases of sarcoma involving the dorsal cord under Dr. Carlill's own care there was priapism in two, and in one of these it persisted throughout the illness—six months; the intensity of the lesion was at the fifth dorsal segment. In a case of fracture of the twelfth dorsal vertebra priapism occurred rapidly and was relieved by laminectomy. A feature of some cases of cord injury was excessive sweating from an area of skin which varied with the level of the lesion. If the injury was above the second dorsal segment the whole body might sweat, but the sweating area was mostly on the head, neck, arms, and upper part of the trunk. With a lesion about the fourth dorsal segment the head and neck might be dry but the rest of the body wet. A lesion at the level of the ninth dorsal segment might cause hyperidrosis over an area which corresponded roughly with that of the sensory impairment, and with lesions below this level the sweating area was apt to be less than that of the anaesthesia.

Dr. Carlill next showed two photographs: (1) A case of compression paraplegia from sarcoma which affected chiefly the fifth dorsal segment. The lower limbs were flexed at the hips and knees, and this attitude persisted after death. It would be recalled that paraplegia in flexion occurred with lesions which affected not only the pyramidal tracts but the extra-pyramidal tracts as well. The effect on the latter tracts was to abolish the reflex tonus of the palsied extensor muscles without interfering with the reflex activity of the paralysed flexor groups. (2) A case showing that even a large bedsore could recover if the cause of the palsy was effectively tackled. The man had syphilitic meningomyelitis with sudden onset of paraplegia. The disease, the palsy, and the sores were all cured permanently. The local treatment of the sore was by sunshine.

A man of 43 was at present under Dr. Carlill's care whose lower limbs had been affected since he had cerebro-spinal fever in 1917; the disability had become progressively worse during the last two years. The clinical diagnosis was compression paraplegia from a lesion at the sixth dorsal segment, a meningitis serosa circumscripta originating from the cerebro-spinal fever. The lumbar puncture needle

filled with cerebro-spinal fluid, but no fluid could be persuaded to flow. The fluid from a low dorsal puncture contained 0.02 per cent. total protein and 17 lymphocytes per cubic millimetre. Lipiodol was injected through a high dorsal puncture, and the radiogram showed the lipiodol held up at a point opposite the body of the seventh dorsal vertebra. At the operation there was found a considerable fluid swelling covered by thickened arachnoid; when this was removed a quantity of cerebro-spinal fluid gushed out and the compressed spinal cord with its vessels came into view. A bougie was then passed upwards and the subarachnoid channel found to be free. The passage downwards was obstructed by another cystic swelling, which was also removed. The man had made definite but slow progress. The cord had been compressed for a long time: below the site of compression it had suffered probably more from obstruction to its blood supply than from deprivation of its cerebro-spinal fluid. It would be recalled that the anterior spinal artery and the two posterior spinal vessels arose from the cranial portion of the vertebrals. If the cerebro-spinal fluid was not a nutrient of the cord a feeble circulation of it as regards both rate of flow and quantity was without significance. The diagnosis in this case was made on the history and clinical evidence, and was supported by the failure to obtain cerebro-spinal fluid by lumbar puncture. It was confirmed by the lipiodol injection and the *x* rays, and proved by operation. Although the ultimate freedom of the subarachnoid channel had been proved by the passage of the bougie, it was still impossible to collect cerebro-spinal fluid by lumbar puncture two months after the operation. The cerebro-spinal fluid from a low dorsal puncture on June 26th, 1924, contained 12 lymphocytes per cubic millimetre, globulin in definite excess, and 0.14 per cent. total protein.

For a few years physicians had been in the habit of comparing the chemical composition and the cellular content of samples of cerebro-spinal fluid taken from below and above the site of a suspected block in the subarachnoid space. This differential examination, from the point of view of the fact of compression of the cord rather than from that of the nature of the compressing force, had lost some of its value now that they had lipiodol, but as cerebro-spinal fluid was necessarily withdrawn from whatever site the lipiodol was injected, it was convenient to examine it. Even if lipiodol were not used to demonstrate the lower level of the compression, he had always withdrawn, when possible, some cerebro-spinal fluid in the preliminary survey of the case. Authors were accustomed to recommend that lipiodol should be injected into the cisternal space to demonstrate the upper level of an obstruction. Cistern puncture was an occipito-atlantal puncture; the thickness of tissue traversed in the adult was about 5 cm., and the space between the dura mater and the medulla, when the needle was inserted at the correct angle, was nearly 3 cm. The chief uses of cistern puncture were three: (1) for the collection of cerebro-spinal fluid from above a block in the subarachnoid space; (2) combined with lumbar puncture, for the irrigation of the subarachnoid space; (3) for therapeutic injections, or the injection of lipiodol. In health the cerebro-spinal fluid from the cistern and lumbar regions was identical. The pressure was the same, and the subarachnoid space could be proved to be a free channel. The lumbar cerebro-spinal fluid was sometimes normal below the site of proved compression. In cases of subarachnoid block the lumbar cerebro-spinal fluid might differ from that from the cistern. The pressure relations also varied; this variation had proved to be of greater importance than the variation in chemical composition, etc., because changes of the latter type might be caused below the site of degenerative changes in the cord, and apart from compression. Lipiodol had rather usurped the place of the former contrasting of specimens of cerebro-spinal fluid. For the purpose of demonstrating the upper level of a block with lipiodol it was necessary only that the injection should be made above the block. It did not matter how high it was made. As a rule they were able from clinical evidence to determine the segmental level of the upper part of the lesion; it was less easy with the lower. Lipiodol not only gave the relation of the lesion to the bones, but it indicated whether obstruction was complete or partial. As with everything else, cistern puncture was easy enough for those who knew how to do it and who had had opportunities of practice. But there were, and there would continue to be, physicians who had neither the knowledge nor the experience. Moreover, some patients had necks which it was inadvisable to puncture by reason of acne, carbuncles, or other sepsis. In these, lipiodol might be injected by cervical or dorsal puncture. It should be remembered that lipiodol once injected took a long time to disappear from the subarachnoid space, and this fact militated against its further use after, for instance, an operation had been performed for the purpose of removing a block. He had seen one case of septic meningitis subsequent to lumbar puncture.

On three occasions Dr. Carlill had failed to withdraw cerebro-spinal fluid by lumbar puncture. One was the case of circumscribed serous meningitis previously described. Another was somewhat similar, in which a lesion of the cauda equina supervened on an attack of tetanus. Both these cases had received the appropriate intrathecal treatment, but it was unlikely that treatment caused the conditions which were found. In the tetanus case it was only in the lumbar region that failure to withdraw cerebro-spinal fluid occurred, and this in spite of the fact that a general anaesthetic was employed. The fluid higher up was healthy. The third case was that of a boy with a pineal cyst. It should be remembered that failure to withdraw cerebro-spinal fluid or to assess correctly its pressure might be due to obstruction anywhere between the cerebral ventricles and the point of exit of the needle.

Dr. Carlill doubted the accuracy of Dr. Feiling's statement that, apart from syphilis, a true positive Wassermann reaction in the cerebro-spinal fluid was found in some cases of spinal tumour. In cases of meningitis due to causes other than syphilis the Wassermann reaction in the fluid was often positive, provided that the serum reaction was positive. His cases had been chiefly sarcoma, fractures with dislocation, syphilitic meningitis, and tuberculous caries. It was noteworthy that at operation and also at autopsy the cord in some cases had appeared to be intact and untouched by the compressing agent, although signs of paraplegia had been obvious. In a case in which sarcoma involved the lumbar and also the cervico-dorsal spine there was general weakness and a bedsore, but no reflex, sensory, or sphincter abnormality. In none of four cases of sarcoma was there any cells in the cerebro-spinal fluid, but each fluid contained excess of globulin. Of two cases of tuberculous lumbar caries, the fluid of one was healthy; in the other there was excess of globulin but no cells. It was useful to carry a bottle of saturated solution of ammonium sulphate to test for excess of globulin. A rough determination that there was an excess might be made by noting the amount of froth on shaking the tube.

He had had but one case of true xanthochromia with massive coagulation. The lesion was syphilitic meningitis, affecting chiefly the lumbo-sacral region. When faecal incontinence and retention of urine were added to painful weakness of a lower limb, the former diagnosis of sciatica was doubted. The cerebro-spinal fluid contained 364 polymorphs and 116 lymphocytes per cubic millimetre. The fluid in these cases of massive coagulation contained not only an increase of albumin, but also a type of albumin usually absent—namely, fibrinogen. Xanthochromia needed to be distinguished from the yellow colour of former haemorrhage. In a case of carcinoma affecting the cauda equina, secondary to disease of the breast, the first few drops of cerebro-spinal fluid were yellow. After a small movement of the needle the subsequent fluid was perfectly colourless. It contained 11 lymphocytes per cubic millimetre, excess of globulin, and 1.05 per cent. albumin. Incision of the distended dura mater relieved the pain. Two or more tubes should always be ready. A valuable and ready method of counting cells with the ordinary haemocytometer was described by Baker in a report on cases of syphilis of the nervous system by Hildred Carlill, Fildes, and Baker in the *Journal of the Royal Naval Medical Service*, October, 1917. From the standard of the amount of information to be gained by the procedure at the time and in the laboratory he regarded

diagnostic thecal puncture as the most important operation in medicine. From the patient's point of view, freedom from pain and after-effects was urgently necessary. From the physician's standpoint they were equally necessary, especially in view of the probable necessity to repeat the operation not once but many times. The pathologist wished for a fluid without a single red cell produced by operative trauma. These various considerations—pressure, quality, colour, "dry tap," etc.—made it clear that the operation should be performed only by the expert or under his supervision. If the patient did not see the needle and did not hear it spoken of he should be unaware that one had been used.

In conclusion Dr. Carlill wished to suggest that greater care should be taken of terminology in describing physical signs. "Babinski normal" had no meaning: presumably what was meant was "Plantar response: flexor." "Plantars in excess" conveyed nothing to the mind. "Knee-jerks brisk (or absent); no ankle clonus," likewise conveyed very little, for it did not tell us whether the ankle-jerks were present or abolished; if they were absent, of course, there could be no clonus. Lastly, a too ready use of five diagnoses should at all times be avoided—they were neuritis, lumbago, rheumatism, sciatica, myalgia.

Dr. J. W. BURROW (Leeds) emphasized the occurrence of vertebral rigidity in cases of spinal cord tumour, and showed a case of extramedullary spinal tumour, successfully operated upon by Mr. Daw of Leeds, as an illustration in the discussion. He considered small qualitative and quantitative changes in sensation of the utmost importance in diagnosis, and advocated the use of Head's algesiometer for the purpose of sensory examination. Agreement was expressed with the opener of the discussion in his statement that paraplegia due to tumour pressure often went undiagnosed. He also mentioned cases of paraplegia following slowly upon a slight trauma; knowledge of their pathology was sought. The fact that a positive Wassermann reaction was occasionally obtained with highly albuminous cerebro-spinal fluids—almost certainly non-syphilitic—was commented upon. Dr. Burrow expressed some dissatisfaction with lipiodol as an aid in diagnosis. He had seen retention of urine follow its use, and would only employ it in a few very difficult cases.

Mr. GEOFFREY JEFFERSON (Manchester) said that as regards the cerebro-spinal fluid in paraplegia, in general, any pathological process which compressed the cord interfered with the ready passage of cerebro-spinal fluid alongside it. Whether the compressing agent was outside the theca or within it, stasis in the distal or caudal portion would equally occur, and evidence of this stasis would be discoverable in the chemistry of the fluid. These changes in the cerebro-spinal fluid might be summarized as falling under the following headings: (1) changes in colour; (2) changes in chemical composition; (3) changes in pressure. With regard to the first point, he was interested to hear that a true Froin's syndrome, a xanthochromatosis with rapid massive coagulation, had been so rarely met with. He had seen it so far in its most characteristic form once only—a case in which a vertebral growth had invaded the cauda equina with complete cerebro-spinal block. Changes in the constitution of the fluid occurred with stasis, but they were apt to be more profound with intradural tumours than with extradural. For when the blocking agent, usually a tumour, lay within the theca the albuminous and salt exudates from that tumour passed directly into the cerebro-spinal fluid. These exudations were presumably given off from all surfaces of the tumour, from the upper no less than the lower, and hence xanthochromia or albuminosis might be present in the fluid above as well as below. For this reason changes in chemistry and colour did not necessarily mean that the fluid tested had been withdrawn from below the growth. But since in the fluid below the tumour stasis was added, the cerebro-spinal fluid changes would be more profound. If the fluid, then, was very definitely abnormal, there was strong presumptive laboratory evidence (ignoring for the moment the clinical signs) that the tumour was above the point of puncture. It went without saying that this would generally be the case, since the ordinary lumbar puncture was made between the fourth and fifth lumbar vertebrae, and the whole of the cord lay above. The point was worthy of consideration, however, for they did not yet know to what extent the cerebro-spinal fluid was altered by stasis alone and to what extent it was changed by exudations from tumours or exudations within it. The hard fibroma or endothelioma, for instance, could hardly influence the composition of the fluid profoundly by "weeping" into it.

With regard to spinal fluid pressure a simple test could be employed. Normally, any rise in cerebral venous pressure showed itself readily and rapidly in an accompanying rise in cerebro-spinal fluid tension. Thus, a cough, or a straining with the mouth closed, caused a rise in cerebro-spinal fluid tension. The same effect could be produced in a more controllable manner by compression of the jugular veins in the neck (Queckenstedt's manœuvre). In the presence of a complete spinal block the rise in cerebro-spinal fluid tension would not be transmitted to the distal portion. If the block were only partial the rise would be delayed. This test, like any other single test, was corroborative only, but it was of considerable physiological interest. It was very little extra trouble to attach a manometer to the lumbar puncture needle before collecting fluid, and to try the effect on cerebro-spinal fluid pressure of congestion in the head. It was not generally necessary to compare this with the fluid pressure obtained by high spinal or cistern puncture, although the comparison of the two made the picture complete. Ordinarily one could obtain sufficient information from noting the latest period before any rise occurred, and the extent of that rise when it took place (see Ayer, *Arch. Neurol. and Psych.*, January, 1922).

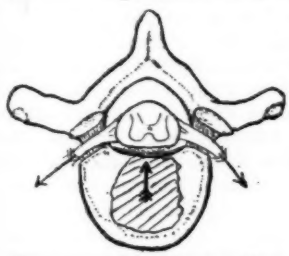
In connexion with lipiodol there was already a considerable and a growing literature. So far no serious ill results following on its proper use had been described, and for that reason the cases mentioned by Dr. Burrow were of considerable interest. Much had still to be done in the precise observation and recording of its effects. One of Mr. Jefferson's patients had a temperature of 104° F. the evening of the injection, but no further reaction occurred. There was no block present in this case, and the cause of the pyrexia was obscure. Lipiodol was always described as being very considerably heavier than the cerebro-spinal fluid, but Sicard had evidently realized himself that it was not so heavy that it would fall like mercury. In his last paper he advocated waiting an hour before the *x*-ray photograph was taken in order to admit of better gravitation; for it was certain that droplets were held up by the slightest obstruction. This delay was wise, and seemed to be a strong argument in favour of high injection as against low injection and inversion of the patient. Lipiodol was a valuable adjuvant, a help in diagnosis, but no more. Whether they were using it a trifle too enthusiastically they should learn from their collective experiences.

With regard to paraplegia in spinal tuberculosis, one could not think of spinal tuberculosis without associating with it the name of its original observer; the terms in which he announced his discovery were of peculiar interest to a neurological section. Pott, in his original papers ("Remarks on that kind of palsy of the lower limbs which is frequently found to accompany a curvature of the spine," etc.), gave a good account of slowly developing spastic paraplegia. He made particular note of adductor spasm, and even described involuntary movements. Pott taught the profession to treat this condition, and though his methods might seem to us to have been bizarre in the extreme (rest is not mentioned in his papers), he began to obtain cures, and took an optimistic view of the prognosis of this form of paraplegia. This attitude had been fully justified by the subsequent history of this complaint, for to-day it showed a higher percentage of recoveries than any other form of paraplegia. The actual incidence of palsy in vertebral tuberculosis was probably somewhere about 5 per cent. Taylor and Lovett gave it as 13 per cent. (*Med. Record*, 1886), but Charlton Wallace, in a recent and valuable statistical summary, found 79 paraplegics in 1,649 cases of spinal caries treated at the New York Hospital for the Ruptured and Crippled—that is, 4.7 per cent. (*Journ. Bone and Joint Surgery*, 6, 1924). Paralysis was certainly on the decline owing to the more efficient treatment of spinal tuberculosis to-day. Thus it rarely developed in

children undergoing treatment, though it might occasionally appear even then. Paraplegia in adult Pott's disease was a much more serious affection, no doubt because it signified extensive bone involvement. Further, a correct diagnosis was often delayed, for spinal deformity might be absent. Most surgeons had seen cases of Pott's disease in adults where treatment had been carried out for a year or more on a diagnosis of rheumatism, fibrositis, or osteo-arthritis—diagnoses that had been corrected only by the appearance of a lumbar or psoas abscess.

Since the rational treatment of this form of paraplegia could only properly be appreciated by a knowledge of how the paralysis was brought about, some discussion of this point was inevitable. Pott himself insisted that it was not the deformity itself which caused the spinal compression, and that it was not due to bone pressure. Charcot (*Leçons du Mardi*, 1888-89) held that it was due to pachymeningitis, "pachyméningite externe tuberculeuse," whilst recently Sorrel and Sorrel-Déjerine (*Rev. Neurol.*, 1924), as Dr. Feiling had said, discriminated between the modes of onset of the paralysis when the cause was abscess and when the cause was pachymeningitis—rapid in the former and slow in the latter. These authors also printed an excellent photograph of a case of cord compression by bone in an old Pott's disease, lest we were tempted to forget that such a thing was possible.

The problem of laminectomy in Pott's disease was an ancient one, and, whereas at one time surgeons were enthusiastic in its favour, the bad results which had followed ill conceived operations had chilled enthusiasm. To-day they would generalize by saying that laminectomy was not indicated in carious paraplegia, but he thought all would make reservations. The chief argument against it was that 80 per cent. of cases recovered the use of their limbs with conservative treatment alone (Wallace). What of the remaining 20 per cent.? Where the paralysis remained stationary, or even increased, after strict immobilization had been instituted, laminectomy would have to be considered. Certainly this might offer the only hope if serious sensory loss was developing. But these cases were fortunately uncommon. As a rule, improvement followed very rapidly on immobilization of the spine with hyperextension, and sometimes cure of the paralysis, but not of the disease, was effected within three months. Operation was most likely to do good when abscesses were present in the vertebral canal, less likely to be of value when the cause of the palsy was a pachymeningitis.



Diagrammatic schema illustrating the normal anterior fixation of spinal cord. Any pathological process originating in the vertebral body impresses the anterior aspect of the spinal cord, which cannot readily move backwards.

Mr. Jefferson's views on the place of laminectomy in Pott's disease were based on the surgical anatomy and means of fixation of the cord. Normally, fixation was effected by means of the issuing nerve roots passing on and into the intervertebral foramina. These roots ran in a definitely forward direction (see figure) and laced the cord on to the vertebral column much as encircling branches fixed ivy to the trunk of a tree. This anterior fixation was assisted by the close connexion between the anterior surface of the dura and the posterior common vertebral ligament. Further, when the body was flexed, and especially if a localized kyphosis existed, the cord was brought into still more intimate contact with the bodies of the vertebrae. Behind, the cord was relatively free and the dura had no connexion with the ligamenta subflava or laminae, from which it was separated by a pad of cellular and adipose tissue. The cord was, therefore, particularly vulnerable on its anterior surface from any injury or disease of the bodies of the vertebrae, for it could not readily move away from them. A collection of fluid or caseous material or of granulation tissue on the backs of the vertebral bodies would impinge very readily on the cord itself. Whether this was the cause of motor paralysis being an earlier manifestation than the sensory changes he could not say. It had always seemed to him to be a question of functional phylogeny rather than a point in vascular supply. Possibly its pathology was a mixed one. It seemed very probable, however, that the most benign cases of paraplegia—those in which an improvement in the condition of the limbs followed in a few days of extension and fixation—there had not been even an external pachymeningitis. In these cases a collection beneath or involving the posterior common ligament projected backwards against the cord, forming an elevation, which would be mechanically enhanced by the collapse of the anterior parts of the vertebral bodies at that point. This explained why many laminectomy operations had been futile. The pressure was not exerted by the laminae themselves, but by a pathological process compressing the front of the fixed cord. Many excellent drawings illustrating these points were to be found in Alquier's valuable paper (*Nouv. Iconog. de la Salpêtrière*, 19, 1906). The operation of laminectomy was to be undertaken with a clear conception of the objects aimed at. Removal of the laminae alone was useless. The most successful cases would be those in which an abscess was found in the vertebral canal; cases where there were masses of granulation tissue would be less favourable, and some attempt should be made to curette this tissue from the backs of the vertebrae. This required the greatest gentleness and no little experience of cord surgery. No attempt should be made to treat radically the bone condition; the object of the operation was the relief of cord compression and not the cure of the vertebral disease. The operation itself was to be carried out with the most complete haemostasis and the utmost gentleness which the surgeon could command. Care must be taken not to carry the bone removal so far laterally as to interfere with the zygapophyses, else the stability of the back might be so far jeopardized as to lead to disaster.

In conclusion, Mr. Jefferson endorsed Dr. Feiling's remarks on the lamentable manner in which many cases of advancing spinal paralysis were allowed to progress to a hopeless condition. Spinal tumours and brain tumours were much commoner than was generally believed, and they should all be on guard lest they escaped notice.

The President (Dr. GRAINGER STEWART) dealt with some of the surgical aspects of compression paraplegia. Chronic leptomeningitis did not improve permanently with operation; the compression of the spinal cord was probably due to a fluid pressure rather than to the meningitis, since sensation was temporarily restored within twelve hours of operation.

In cases of intrathecal tumour the most frequent position for the tumour was between the anterior and posterior roots and attached to one or the other. The onset of the symptoms in such cases was very typical, and was due to purely mechanical causes. No compression would result until the tumour reached a sufficient size; it was most important to recognize these tumours, as they were easily removed and the results of operation were excellent. As the tumour enlarged it first produced pressure on the lateral column of the same side, the first symptom being that the patient complained of "jumping" of the leg at night. Next, the leg was inclined to give way at times on walking—probably due to reflex spasm. Then the leg tended to drag until finally some degree of paresis was evident. Changes in the abdominal reflex of the affected side occurred very early; at first it was more easily exhausted than that on the opposite side, and later became reduced, with a corresponding increase in the deep reflexes of the leg of the same side. At this stage the plantar reflex might be doubtful or indefinite. He had followed several cases from the earliest manifestations, and motor weakness invariably occurred before any sensory changes developed. The first sensory sign was blunting to pain, heat, and cold in the opposite leg, reaching up to within three or four segments of the lesion. These three or four segments represented the space occupied by the sensory fibres in crossing from one side to the other. It was thus seen that the signs tended towards a Brown-Séquard symptomatology.

As regards Pott's disease, the paraplegia had to be watched carefully. If the paraplegia was of the flaccid

variety and was not recovering, the case should be operated upon to prevent the spinal cord from becoming permanently damaged. Opened abscesses should be swabbed out with strong mercury perchloride solution. In cases of tuberculous pachymeningitis, root pains invariably occurred or pain on movement, and often muscular spinal rigidity; the tissues might also feel boggy on palpation. The old test of running a hot sponge up the back was sometimes very useful.

The most rapidly fatal cases of compression paraplegia were those due to sarcoma. Secondary growths from the kidneys and the suprarenal gland had been more frequent at the National Hospital, Queen Square, as a cause of compression paraplegia than those from carcinoma of the stomach or the rectum. A further point in diagnosis was that in cases of chronic leptomeningitis there might be a complaint of abdominal tightness with no objective sensory signs whatever. In all compression paraplegias sphincter involvement did not occur until there were signs of bilateral pressure; in cases of leptomeningitis sphincter trouble often developed early.

Dr. C. WORSTER-DROUGHT (London) dealt with the practical difficulties that arose in the differential diagnosis of lesions involving the lower cervical and upper dorsal regions of the spinal cord; more especially between (1) compression of the cord, by pachymeningitis or tumour, and syringomyelia with local undissociated anaesthesia and "central" pain; (2) intramedullary tumour and syringomyelia with Brown-Séquard syndrome; (3) early compression paraplegia without sensory changes and a pure spinal type of disseminated sclerosis.

(1) *Compression of the Spinal Cord (Pachymeningitis or Tumour) and Syringomyelia with Local Undissociated Anaesthesia and "Central" Pain.*—With regard to the differential diagnosis between these two conditions, he had met with the case of a young man who came complaining of weakness in the arms and legs and severe pain radiating from the base of the neck down the arms. On examination the patient showed considerable spasticity and loss of power in the upper limbs with bilateral atrophy of the muscles of the shoulder girdle; spastic paraplegia with diminished abdominal reflexes, increased knee- and ankle-jerks, and a bilateral extensor plantar reflex; bilateral, though asymmetrical, loss of cutaneous sensibility of root type to all forms of stimuli (light touch, pain, and thermal) over an area extending across the shoulders and base of the neck, the upper part of the chest, and down the arms—comprising an area supplied from the fifth cervical to the second dorsal spinal segments. There was no loss of sensation elsewhere. The patient also complained of intense pain radiating from the neck across the shoulders to the front of the chest and down the inner side of both arms. On lumbar puncture was obtained only a small quantity of cerebro-spinal fluid, which showed a normal cell count, increased protein content, and a negative Wassermann reaction. From *x*-ray examination, the report stated that "the third and fourth dorsal vertebrae appear to be diseased." Lipiodol had not then been introduced; in any case, Dr. Worster-Drought doubted the advisability of using lipiodol when a lesion extended so high in the cervical region, and, as events proved, it would have been of no help. Such a clinical picture rendered it extremely probable that a lesion was compressing the spinal cord and involving the anterior and posterior spinal nerve roots. It was decided, therefore, to give the patient the chance of benefit offered by operation. At the laminectomy performed by Sir Charles Ballance, a large syringomyelia was found involving the area indicated; this was merely incised in the mid-line and the fluid it contained allowed to escape. The case, therefore, was one of syringomyelia with the rather unusual phenomenon of "central" pain, believed to be due to the distension of the central canal of the cord. The character of the sensory changes and the absence of any dissociated anaesthesia at this stage were noteworthy features. (At a later stage, however, the patient developed dissociated anaesthesia in the legs.) In view of the large size of the syringomyelia and the small amount of cerebro-spinal fluid obtained at lumbar puncture, the increased protein content was not surprising. Another interesting fact was the remarkable improvement in the "central" pain that followed operation, which pain, incidentally, had never recurred. The case, apart from its other interesting features, illustrated a difficulty that sometimes arose, and Dr. Worster-Drought considered it preferable to operate on three cases of syringomyelia rather than allow a curable case of compression paraplegia to remain unrelieved.

(2) *Intramedullary Tumour and Syringomyelia with Brown-Séquard Syndrome.*—When a syringomyelia involved mainly one-half the transverse diameter of the spinal cord, the differential diagnosis between these two conditions was extremely difficult, as the physical signs might be identical, and the cerebro-spinal fluid examination and the injection of lipiodol were of no assistance. In a case that Dr. Worster-Drought saw in 1915 this difficulty arose. The patient—a woman, aged 25—complained of weakness in the right hand and right foot, with no pain whatever. On examination there was weakness and wasting of the intrinsic muscles of both hands, which was more advanced in the right hand than the left; spastic weakness of the legs (right more marked), with right knee- and ankle-jerks greater than the left, and right extensor plantar reflex; left abdominal reflex greater than right; loss of cutaneous sensation to all forms of stimulus over the ulnar distribution of both hands, with absence of pain and thermal cutaneous sense over the left leg and mainly the left side of the trunk, extending upwards to just below the clavicle. There was no spinal rigidity or tenderness. Syringomyelia appeared to be the probable diagnosis. As she was becoming rapidly worse, however, she was admitted to the National Hospital and operated upon by Mr. Armour, who successfully removed an intramedullary tumour from the lower cervical region. The patient made an excellent recovery, and three years later wrote to say that "she still had the full use of all her limbs, and was able to do her own washing and look after the children." At the present time Dr. Worster-Drought had under his care a case of intramedullary lesion, in which it was doubtful whether the condition was one of syringomyelia or intramedullary tumour. It was that of a young man, aged 21, who showed a right-sided increase of all deep reflexes, absent abdominal reflexes, right ankle clonus, and right extensor plantar reflex (left indefinite), atrophy of the intrinsic muscles of the right hand, with left-sided cutaneous anaesthesia to pain and thermal stimuli (light touch being everywhere normal) involving the left leg and extending up the trunk to the level of the fourth rib.

(3) *Early Compression Paraplegia without Sensory Changes and the Spinal Type of Disseminated Sclerosis.*—The difficulty of distinguishing between these two conditions frequently arose. The spinal type of disseminated sclerosis—with splastic paraplegia and possibly some degree of unequal muscular weakness in the arms, with no cranial nerve or speech abnormality—was well known, and one seldom found any sensory change beyond the occasional impairment of postural sense; at the same time, all had agreed that in compression paraplegia disturbances of sensation were very late in their appearance. The presence even of nystagmus would not favour disseminated sclerosis, for, as Dr. Feiling mentioned, it had been described in association with lesions of the cervical part of the spinal cord. Also, a negative *x*-ray examination would be reported in disseminated sclerosis and in many cases of compression paraplegia; lipiodol might be of assistance, but again arose the question of the very doubtful advisability of using the substance in lesions of the cervical portion of the cord. The cerebro-spinal fluid examination—especially the colloidal gold reaction—might be of considerable help. A large increase in protein content would suggest compression paraplegia, but it had to be borne in mind that a slight increase was often found in disseminated sclerosis. A positive colloidal gold reaction (with negative Wassermann and a normal cell-count) would favour disseminated sclerosis; in his (Dr. Worster-Drought's) experience the colloidal gold curve in the spinal type of disseminated sclerosis was far more often "luetic" than "paretic." From a series of colloidal gold reactions in many cerebro-spinal fluids which he had investigated in conjunction with Drs. C. Lovell, Roche Lynch, and H. J. B. Fry, it was found that the "paretic" type of curve was usually found in disseminated

sclerosis only when there was evidence of cerebral or cranial nerve involvement; the vast majority of cases of the spinal type yielded a curve of the "luetic" type. In a case of lesion of the cervical part of the spinal cord met with last year, the diagnosis lay between compression paraplegia and the spinal type of disseminated sclerosis. There were no sensory changes and the *x*-ray examination was negative. The cerebro-spinal fluid (easily obtained in quantity) showed a normal cell-count, slightly increased protein content, negative Wassermann reaction, and a positive colloidal gold reaction with a "luetic" type of curve. The subsequent history of the case confirmed the diagnosis of disseminated sclerosis. Dr. Worster-Drought had seen a complete Froin's syndrome—with xanthochromia and spontaneous massive coagulation—most frequently in connexion with cerebro-spinal fever, especially in cases of complete paraplegia following immediately upon the acute attack. It also occurred in this disease apart from paraplegia. In his experience, Froin's syndrome was decidedly rare in other forms of compression paraplegia, although an increased protein content with no change in the cell-count ("dissociation albuminocytologique") was relatively common.

*Puncture of the Dorsal and Cervical Theca.*—With regard to Dr. Hildred Carlill's suggestion of puncturing the theca in the dorsal region for the injection of lipiodol, Dr. Worster-Drought considered that more risk was attached to such an operation than to puncture of the cisterna magna. Many individuals were devoid of a continuous posterior sub-arachnoid space in the dorsal region, the septum posticum being absent and the dura-arachnoid adhering directly to the posterior aspect of the spinal cord. Lusk, in dissections of the spinal meninges in eleven subjects, had found that, of the eleven, only three had present a complete posterior sub-arachnoid space extending throughout the dorsal region into the cervical region. In the other eight cases he had found adhesions between the dura-arachnoid and the posterior aspect of the cord at some situations between the conus medullaris and the cervical region; in three of these cases the dura-arachnoid was adherent to the entire posterior surface of the spinal cord from the level of the conus medullaris to the cervical region. Consequently, in puncturing the dorsal theca, there was always the risk of inserting the needle directly into the spinal cord. The only untoward incident he had seen follow puncture of the cisterna magna—apart from headache and occasional vomiting—was a unilateral and intense hyperaesthesia of the face. This was possibly of physiological interest, as it might be due to a slight trauma (by the point of the needle) to the tuberculum Rolandi at the side of the medulla—where the sensory spinal root of the trigeminal nerves comes to the surface—with consequent irritation. In the case in question the puncture was performed by a zealous house-physician, and the hyperaesthesia persisted for about a week—preventing the patient's shaving—and then entirely disappeared.

## THE QUANTITATIVE OBSERVATION OF KERNIG'S SIGN BY A WHEEL GONIOMETER.

BY

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No one will dispute the usefulness of Kernig's sign, especially in suspected meningitis. By the following method its usefulness, I think, is considerably increased. The trouble with Kernig's sign is that the clinician is often in doubt whether to consider it present or absent. For this there are two reasons: (1) Doubt as to the force we should use in flexing the leg on the trunk, for this varies with the muscles and age of the patient. (2) Variations due to the age of the patient: for the angle at which Kernig's sign begins to be positive is clearly very different for a baby who can suck his own toe and a stocky middle-aged man who is far from being able to do so. But if we can measure Kernig's sign from day to day in a case of doubtful meningitis and find that it is slowly increasing, then we have no doubt that it is (and was) present. Also, we can measure its gradual dwindling in convalescence.

How then are we to measure Kernig's sign? We need not only a handy goniometer* [demonstrated], but also a method of deciding on the angle of Kernig's sign, which shall be independent of the force used. The method which I have found reliable during the last four years is this: The patient lies flat on his back on the bed, horizontal; the doctor lifts the leg off the bed with the palm of his hand behind the calf, just below the middle of the tibia. The other hand steadies the leg just above the knee, but exerts no pressure. As the leg is raised from the bed, a critical angle is reached when the knee bends automatically—presumably to ease the stretching of the sciatic nerve caused by flexion of the hip. When you are satisfied that the limb is flaccid and that this critical angle (at which knee flexion just occurs) is constant, you measure the angle with the goniometer; it should be about 90 degrees. In meningitis it may be far less, perhaps 45 degrees.

The goniometer consists of a spindle acting as a pivot both for a yard of string and for a wheel graduated in degrees. The wheel is weighted so that the zero mark always floats to the top. For this latter device there are two reasons: (1) only one angle need be read (instead of two and subtracting); (2) the instrument need not be burrowed into the bedclothes to the actual hip-joint, but can be applied anywhere along the femur. The string is then stretched along the leg to the external malleolus while an assistant holds the leg up in the air at the critical angle, which has already been determined. Read off the graduation on the rim of the wheel where the string intersects it; this is the angle of Kernig's sign. The goniometer is far simpler to use than to describe; my house-physicians have no difficulty with it. This instrument is also useful for measuring improvement in the flexion of stiff joints of limbs, as in compensation cases, also in sciatica.

In sciatica, I have observed that, whilst the patient slowly rises from lying to sitting, the knee of the affected limb flexes sooner than the sound one. This is another way of eliciting my variant of Kernig's sign.

# SECTION OF PATHOLOGY AND BACTERIOLOGY.

Professor C. H. BROWNING, M.D., President.

## CRITERIA OF TRANSMISSION AND CULTIVATION OF ENCEPHALITIS AND ALLIED VIRUSES.

BY

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DURING the past few years a considerable amount of work has been done on the experimental transmission of diseases of the central nervous system to animals, particularly with regard to encephalitis lethargica. Widely divergent results have been claimed by different workers in their attempts to transmit this disease to rabbits by the inoculation of human material. Loewe, Hirschfeld, and Strauss[1] assert that the disease can be transmitted to rabbits, the criterion of infection being the finding of certain brain lesions in the inoculated animals on microscopical examination. They state that the changes consist of a marked meningitis with an infiltration of mononuclear leucocytes. The small blood vessels in the cortex and in the basal ganglia show a perivascular infiltration with mononuclear cells, and there may be areas of mononuclear infiltration surrounding a zone of necrosis. These lesions are stated to be similar to those found in the human brain in encephalitis lethargica and to be diagnostic of the experimental disease. Moreover, they have claimed the isolation of a micro-organism which they regard as the etiological agent of encephalitis lethargica, and that when cultures are inoculated intracerebrally in rabbits lesions similar to the above are found. Based on these results, they assert that the culture causes encephalitis lethargica. These results have been confirmed by Thalhimer,[2] who regards the presence of brain lesions as being diagnostic of the experimental disease. Kling, Davide,

* This instrument is being made by Down Brothers.

and Liljenquist[3] have also claimed that the virus of encephalitis lethargica can be transmitted to rabbits. In their experiments intracerebral inoculation of human material produced no observable symptoms, and the animals died many months after the injection. Sections of the brains revealed perivascular and meningeal infiltration with mononuclear cells, and from these results the authors assert that the transmission of encephalitis virus to the rabbit has been accomplished. These authors point out that not all rabbits are susceptible to the disease, but that only 50 to 60 per cent. of the inoculated rabbits reveal these cerebral changes. McIntosh[4] also regards the finding of brain lesions in the rabbit as evidence of transmission of encephalitis virus. It should also be noted that Reasoner,[5] Plaut and Mulzer,[6] working with experimental syphilis in the rabbit, assumed the presence of perivascular infiltration in the brains of the inoculated animals to be evidence of cerebral syphilis. On the other hand, other workers—Levaditi,[7] Doerr,[8] Flexner[9]—have shown that the so-called encephalitis virus produces definite and characteristic symptoms in the rabbit. After a short incubation period there is an elevation of temperature (up to 109° F.), retention of urine, gnashing of teeth, uncontrolled wild muscular movements, paralysis and convulsions, and finally termination in death within seven days. These observers regard the so-called virus of encephalitis as being closely related to, if not identical with, the virus of febrile herpes. Kling, on the other hand, using the presence of brain lesions as the criterion of encephalitis infection of the rabbit, is unable to show any such relationship. It was pointed out by Bull,[10] confirmed later by Oliver,[11] and emphasized by Flexner,[9] that apparently normal uninoculated rabbits may show, on examination of the brain, areas of perivascular and meningeal infiltration with mononuclear cells.

At Dr. Flexner's request I carried out an investigation as to the presence and extent of the brain lesions in laboratory rabbits in the Rockefeller Institute, New York, using a large amount of material that was available at the time.[12] In addition to the ordinary stock uninoculated rabbits, brain tissue was obtained from stock rabbits suffering from snuffles and other intercurrent infections such as pneumonia and subcutaneous abscesses, from rabbits injected intratesticularly with *Spironema pallidum*, and from animals inoculated in the testis with a transplantable tumour. Four types of animals were thus studied. It is to be noted that none of the experimental animals (for the material from which I am indebted to Drs. Wade H. Brown and Louise Pearce) had been inoculated intracerebrally. The total number of rabbit brains examined was 372. The brains were removed whole, and fixed in either 10 per cent. formalin or in Zenker's fluid. Complete transverse sections of the cerebrum, and also, in most of the cases, portions of fore-brain, mid-brain, and medulla, were examined. The sections were stained with haematoxylin and eosin, and, in addition, by Giemsa's method. It is probable that this extended and complete examination of the brain accounts for the high percentage of lesions detected.

### *Results of the Microscopical Examination of Brain Material from 372 Rabbits.*

The lesions found in the brains of these rabbits are characterized chiefly by an infiltration with mononuclear cells, and also in some cases by areas of peculiar localized necrosis. The infiltrative changes may be divided, according to the location, into four types: (1) perivascular, (2) meningeal, (3) in the cerebral substance, and (4) under the ependyma of the lateral ventricles. It is to be noted that several or all of these types may be present together, and, in addition, localized necrosis. The perivascular, meningeal, and cerebral types are usually found together, but any of the types may predominate. The infiltrating cells are small, round, deeply staining, and mononuclear.

1. *Perivascular Lesions.*—This is the commonest lesion noted, and is often very striking. The infiltration with the mononuclear cells may vary from a single layer to a thick dense sheath, and the cells may also be found in the so-called Virchow-Robin spaces.

2. *Meningeal Lesions.*—Involvement of the meninges is not quite as frequent as the perivascular, and consists of an infiltration into the pia-arachnoid with mononuclear cells. In marked cases there is a broad band of cells on the surface of the brain from which finger-like masses, surrounding the blood vessels, penetrate the brain tissue.

3. *Lesions in the Cerebral Substance.*—These occur, in order of frequency, intermediate between the perivascular and meningeal lesions, being usually associated with the former. There may be a diffuse infiltration with mononuclear cells, or, more often, focal aggregations of cells distributed irregularly.

4. *Lesions under the Ependyma.*—This is the least common lesion, and may only be found in the fore-brain.

*Lesions with Necrosis.*—In 15 per cent. of the total number of brains examined, localized areas of necrosis were noticed in addition to the infiltrative changes. This lesion consists of a necrotic centre surrounded by epithelioid cells, around which is a layer of mononuclear cells. The neighbouring blood vessels show perivascular infiltration. In Giemsa preparations the necrotic centre sometimes shows protozoan-like structures, named by Levaditi *Encephalitozoön cuniculi*, and regarded by some observers as the etiological agent of the lesions.

*Distribution and Incidence of Lesions.*

| Source of Rabbits. | No. of Rabbits Examined. | Percentage showing Brain Lesions. |
|---|---|---|
| Transplantable tumour ... ... ... | 146 | 50 |
| Experimental syphilis ... ... ... | 82 | 40 |
| Normal uninoculated stock ... ... ... | 52 | 60 |
| Natural miscellaneous diseases (excluding snuffles) | 50 | 70 |
| Snuffles ... ... ... ... ... ... | 42 | 76 |
| Totals ... ... ... | 372 | 55 |

From this table it is seen that the lesions of meningo-encephalitis of the types described were present in more than half (55 per cent.) of the total number of 372 rabbits examined, and of which none was inoculated intracerebrally. The lowest incidence was in the syphilis rabbits—40 per cent.; tumour rabbits showed 50 per cent., and apparently healthy stock 60 per cent. In the animals suffering from natural miscellaneous diseases such as pneumonia, septicaemia, and subcutaneous abscesses, 70 per cent. showed lesions, while in the snuffles group 76 per cent. were affected. The areas of necrosis were present in 15 per cent. of the total.

It is thus seen that about one-half of the 372 rabbits showed lesions of meningo-encephalitis, and the recognition of the occurrence of such lesions is of the greatest importance in the interpretation of experimental results based purely on the histological examination of brain tissue. The conflicting results of various observers on the transmissibility of encephalitis lethargica to the rabbit is due to the lack of recognition of spontaneous or accidental lesions in this experimental animal. The pathological changes regarded by Loewe and Strauss as being diagnostic of experimental encephalitis lethargica in the rabbit, and which are described and illustrated in their various papers, appear to be identical with the lesions found in uninoculated rabbits and in rabbits not injected intracerebrally. Therefore their conclusions, which are based solely on the histological examination of the brains of experimental animals, cannot be accepted. The work of Kling and his associates is open to similar criticism. A comparison of the photographic reproductions of what Kling and his co-workers regard as specific encephalitic changes, with the material here described, shows the lesions to be identical. The peculiar necrotic areas which are stated by Kling to be pathognomonic of experimental encephalitis were found in 15 per cent. of the rabbits supposedly normal or not inoculated with encephalitis material. Kling also states that only 50 to 60 per cent. of his inoculated rabbits were susceptible—that is, in which lesions were found. These figures coincide with the present finding that 55 per cent. of rabbits not inoculated with encephalitis material show similar pathological cerebral changes.

*Cultivation Tests with Encephalitis and Herpes Virus.*

The second part of the paper relates to cultivation tests with the so-called virus of encephalitis lethargica and of herpes fibrilis.

In the following experiments two strains of the so-called encephalitis virus (Beckley and Levaditi strains) and one strain of herpes virus (H.F. strain) obtained from Dr. Simon Flexner were employed.[13]

The criteria for establishing the experimental transmission of the so-called encephalitis virus to the rabbit are as follows:

1. *The Period of Incubation.*—This is usually from two to five days after injection, but with weak or attenuated strains periods up to twelve days may elapse before clinical symptoms are noticed.

2. *Symptoms.*—The first symptoms to be noted are elevation of temperature and retention of urine. The former is usually 105° to 106° F., but often reaches 107°, occasionally 109° F. This temperature is sustained throughout the course of the disease until just before death, when it is rapidly lowered and may become subnormal. The retention of urine is a very frequent sign, and may be demonstrated by gently grasping the animal round the loins and using very slight pressure. Then as much as 300 c.cm. of urine may be expressed from the animal. The fever may continue for twenty-four to forty-eight hours, when general symptoms relative to involvement of the central nervous system become evident. The animal is hypersensitive, makes wild, dashing movements, which, owing to disturbance of vision, are often terminated by the animal hitting the wall or other obstacles. After a few moments of quiescence the animal bends back its head, lifts one or both fore paws off the ground, then stands up on its hind legs, and finally falls backwards, forwards, or sideways. Sometimes the animal runs in circles, at other times it may rush forward until it is stopped by some obstacle. Salivation is very frequently observed. The saliva runs freely from the mouth, wetting the fur around the jaws and neck. Grinding or gnashing of the teeth is also very frequently noted. A few hours later the animal becomes weak and paretic, and lies on its side. At this stage the temperature is lowered and the breathing laboured. A convulsive attack follows in which the animal dies.

3. *At autopsy* the viscera are found to be normal. Care must be taken to exclude pneumonia, rabbit septicaemia, or other affections. The brain usually shows slight congestion. There is no apparent meningitis present.

Cultures made from heart blood, lungs, and brain show no growth in ordinary media, thereby eliminating septicaemia, pneumonia, or meningitis, or other known affections as the cause of death.

4. *Transmissibility* of the virus from rabbit to rabbit by means of intracerebral injections of suspensions of affected brain can be effected indefinitely.

*Cultivation Tests in Smith-Noguchi Medium.*

The animal was killed *in extremis* and the brain immediately removed with strict aseptic precautions. The cerebrum was carefully cut into portions about 1 cm. square, and such fragments were added to the Smith-Noguchi medium (fresh sterile rabbit kidney, with ascitic fluid, and covered by a layer of vaseline) and incubated at 37.5° C. Cultures were examined at frequent intervals and films stained by polychrome methylene blue, Gram's and Giemsa's methods. Numerous experiments were done, using the three strains of viruses and also employing variations of the Smith-Noguchi technique, but in no instance were any micro-organisms detected. The results of Loewe and Strauss,[1] who claimed to have cultivated minute "globoid" bodies, could not be confirmed. Since no living multiplying agent could be detected, the viability of the viruses in various media was determined in the hope of finding a suitable pabulum for the multiplication of the incitant.

*Experiments using Collodion Sacs.*

The so-called encephalitis and herpes viruses do not survive for five days when placed with either Ringer's solution or broth, in collodion sacs implanted abdominally in the rabbit.

*Survival of the Viruses in Anaerobic and Aerobic Media.*

If, as Loewe and Strauss state, the virus of encephalitis lethargica multiplies in Smith-Noguchi medium, then *pari passu* the culture should remain active for a long period of time. It was thought that information as to the time the virus can survive in this medium would indicate whether it had merely survived, or had died, or even had multiplied within the cultures, and would thus control the above-mentioned negative results. The viability of the virus was tested by inoculating rabbits intracerebrally with (*a*) the brain fragment itself, and (*b*) the fluid surrounding material surrounding the tissue. In this way the presence of the virus in the fluid medium could be determined, and also the length of time the virus remained active in the brain itself.

Virus, in the form of pieces of brain from a rabbit killed at the height of the disease, was inoculated into a series of Smith-Noguchi tubes and incubated at 37.5° C. At intervals of two days a tube was examined for the presence of the virus. The ascitic fluid was poured off, centrifuged at low speed to deposit particles of brain, and a uniform dose of 0.25 c.cm. of the supernatant fluid inoculated intracerebrally into a young (1,000 gram) rabbit. The piece of brain tissue in the culture was weighed in a sterile capsule and a 10 per cent. emulsion made in normal saline, 0.25 c.cm. of this emulsion being inoculated intracerebrally into a young rabbit. For control, similar pieces of brain were incubated in ordinary 1 per cent. glucose broth and incubated aerobically at 37.5° C. The supernatant broth and fragment of brain were treated and inoculated in a similar manner to the Smith-Noguchi cultures. The experiment was repeated several times with each of the three strains of virus.

*Result.*—After two days' incubation the centrifuged ascitic fluid from the Smith-Noguchi medium was non-infective, showing that the virus had not multiplied or even diffused into the surrounding medium. The virus, however, was still viable in the brain itself up to the sixth, and occasionally the eighth, day, the larger the piece of brain the longer the survival. On the other hand, when incubated in glucose broth under aerobic conditions, the virus was present in the surrounding fluid, the test dose of 0.25 c.cm. being as active as the fresh virus. Moreover, the brain fragments were still infective after twelve days' incubation. The experiments were repeated, the virus being added to these media in the form of ground-up emulsion of brain tissue. Similar results were obtained. Virus could not be recovered from the Smith-Noguchi tubes after two days' incubation, showing that it had either been killed or rendered inactive, while in aerobic broth the virus was still active after four days' incubation. These results show that Smith-Noguchi medium is not favourable even for the survival, much less for the multiplication, of the encephalitic-herpetic viruses. On the other hand, aerobic broth is much less destructive to the virus, which is able to diffuse into the medium and remain alive for six days.

Attempts were made to determine what relation the oxygen tension and hydrogen concentration bore to the destruction of the viruses in Smith-Noguchi medium or their survival in aerobic broth. Changes in the oxygen tension, and variations of the *p*H between 7.4 and 6.2, exerted no appreciable effect.

*Summary.*

Summarizing, therefore: normal stock rabbits reveal in a high percentage of cases lesions identical with those described by other workers as evidence of the experimental transmission of encephalitis lethargica.

The results of experimental work in which the histological findings in the brain of the rabbit have been taken as the criterion for a positive transmission of the virus of encephalitis lethargica to that animal cannot be accepted.

Contrary to the results of Loewe and Strauss, and Thalhimer, who claim to have cultivated the virus of encephalitis lethargica by the Smith-Noguchi technique, this medium is not favourable even for the survival, much less for the multiplication, of the virus. Aerobic broth is a better medium for maintaining the activity of the virus.

These results fail to uphold not only the cultural work

of Loewe and Strauss, but also that of other workers to identify the encephalitis virus with certain ordinary bacteria.

Using an accurate technique, the so-called virus of encephalitis lethargica can be passed from rabbit to rabbit under conditions in which no visible organisms can be detected microscopically or made to grow in culture media.


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# Memoranda:

## MEDICAL, SURGICAL, OBSTETRICAL.

### HYDRAEMIC NEPHRITIS.

THE following instance of this condition, which came under my care rather more than two years ago, was quite the most severe that I can recall. The case notes exemplify the utility, for clinical purposes, of the classification of nephritis as hydraemic or azotaemic, and may prove of use as indicating the line of treatment to be adopted in cases of the former type.

In March, 1922, Mrs. S., aged 46, who had previously been perfectly healthy, sent for me because oedema of the legs had developed. During the autumn of 1921 she had endured the strain of nursing her husband in a severe illness until his death in December. In January, 1922, she was passing large amounts of very clear urine, chiefly during the night and towards early morning. In February she began to pass water almost hourly, very little at a time, and could hardly retain it. In March the amount noticeably lessened, and the legs began to swell. Very soon afterwards she was acutely dropsical in the legs, arms, face, and conjunctivae; there was severe oedema of the abdominal wall and lumbo-sacral regions, and ascites and hydrothorax. She suffered from cough and a choking feeling, and her body was so unwieldy and increased so much in size that she could hardly move in bed. The blood pressure was normal, the systolic pressure being 120 and the diastolic 80. The pulse was quiet and regular, the heart healthy, and the ocular fundi normal. The urine averaged 8 to 12 oz. in the twenty-four hours; it was intensely albuminous, so that, even when diluted by an equal part of water, the albumin filled an Esbach tube to the top mark. The urea concentration test and the diastasic test showed that the kidneys were dealing with nitrogenous substances normally. The symptoms were therefore due to chloride retention.

Light diet and diuretics of various kinds, including digitalis, potassium acetate, caffeine, diuretin, nux vomica, strophanthus, and others, had some effect, since the urine excreted in twenty-four hours rose to 20-30 oz., and by May 15th was 40 oz. The latter figure was reached, however, after all medicines had been stopped for two days. From the beginning of May the protein content of the diet was increased, and fish, eggs, tripe, chicken, bread, biscuits, butter, fruit, tea, and milk were given. During all this time no effect was produced on the general anasarca. No dangerous symptoms developed, but she remained immensely unwieldy and uncomfortable. On May 25th 225 grains of urea were given twice daily, and continued for three weeks; it was then stopped, no appreciable benefit having occurred. The diet was now practically saltless, the bread being specially prepared and other means taken to secure this. At the beginning of her illness, curiously enough, she had a great craving for salt, which of course was not gratified. Throughout the illness attention was paid to the bowels, but even fairly free purgation had no effect. In short, no real improvement had been obtained by any of the means taken. As the anasarca remained intense, affecting especially the abdomen and back, the question of pressure on the kidneys by ascitic fluid and of renal and perirenal oedema arose. The urine in June averaged 8 to 12 oz. in the twenty-four hours.

On June 26th I inserted a Southey tube into the subcutaneous tissues on the outer side of each ankle, and kept them in until June 29th. In that time there drained away 23 pints 9 oz. of fluid, and there was a decided diminution of the anasarca. On July 10th I inserted one Southey tube high up on the outer aspect of one thigh and removed it on July 12th, 9 pints 4 oz. of fluid having drained away. Diuretics were then resumed. The patient was easier and was able to sit up in bed. The urine, which had averaged 20 to 30 oz. in the twenty-four hours, rose on July 20th and 21st to 42 and 58 oz., and on July 23rd and 24th to 60 and 74 oz. respectively. Dietetic and medicinal treatment was maintained as before, and her progress was now steadily good. By September a mere trace of oedema remained with only slight albuminuria, and by the end of the year she was practically well and performing all her household duties. The cardio-vascular and other systems remained normal. From time to time in 1923 I examined the urine, as also recently, and found it to be perfectly normal in all respects, and the patient in sound health and vigorous.

The dietetic treatment in this case was very different from what it was, say, thirty years ago, when many patients were "drowned" by excess of fluids. No treatment did the present patient any good until the fluid in the tissues was mechanically drained away. I regret that I did not tap the legs sooner, for recovery began very quickly after the 32½ pints of fluid were withdrawn. No trouble occurred at the points of insertion of the tubes. The tubes were boiled, inserted through iodized skin, and the whole area was covered with sterile gauze and collodion.

Glasgow. R. O. ADAMSON, M.D.

### PERFORATED GASTRIC ULCER.

THE following account of a somewhat unusual case—namely, perforation of a gastric ulcer, with general peritonitis, in a boy aged 16, with no past history suggesting gastric trouble, and with atypical physical signs—may be of sufficient interest to merit publication.

The patient gave a two days' history of pain extending transversely across the abdomen at the level of the umbilicus. This had not prevented him from working until noon of the day of admission to hospital, when the pain had become more severe and he had vomited for the first time. There was no past history of abdominal pain. The face was flushed and the tongue slightly furred; temperature 99°; pulse rate 92. The abdomen did not move well on respiration; the point of maximum pain was slightly to the left of the umbilicus. The upper halves of both recti and the lower half of the right rectus were slightly rigid. There was no epigastric tenderness; both iliac fossae were tender, especially the left. There was tenderness on rectal examination, greater on the left side.

A provisional diagnosis of acute appendicitis was made, and I accordingly communicated with Mr. L. E. Barrington-Ward, who requested me to operate. Assisted by Mr. H. Sandeman Allen, I opened the abdomen by a right paramedian incision below the umbilicus. General peritonitis was discovered, the peritoneal cavity being full of greenish-coloured fluid. Beyond sharing in the general peritoneal injection, the appendix was normal. The incision was accordingly continued upwards and the stomach examined. A small perforation, surrounded by an extensive indurated area, was found on the anterior surface of the stomach, just below the junction of the middle and right thirds of the lesser curvature. This was invaginated and a piece of omentum stitched over the invaginated area. The wound was then closed, with drainage of the stomach area and of the pelvis. The patient has now made an uninterrupted recovery.

I am indebted to Mr. L. E. Barrington-Ward for permission to publish this case.

A. C. MACONIE, M.B., B.S.Lond.

Royal Northern Hospital, Holloway.

### SUBMUCOUS LIPOMA OF CAECUM.

THE following case seems worthy of record:

Mrs. Y., aged 61, was admitted to the Bedford County Hospital on May 31st, 1924, as a case of appendicitis. The history was that six months previously she had an attack of diarrhoea, followed by attacks of abdominal pain and severe constipation. One week before admission she had severe colicky pain and vomiting.

On admission she had definite tenderness and rigidity in the right lower quadrant of the abdomen. Her temperature was 99° F. and pulse rate 90. Without delay the abdomen was opened by right paracentral incision. The appendix was thickened, but not inflamed. The caecum, which felt as if it contained a mass of worms, was opened by an anterior incision and a submucous lipoma found projecting on the posterior wall. The mucous membrane was incised over the mass, which was then shelled out. The mucous membrane was sutured with fine chromic gut and the caecum closed with a double line of sutures. Recovery was without incident and the patient left the hospital on June 18th.

Submucous lipomata of the caecum and colon are very rare. I have seen one previous case, which occurred in a patient of mine, a man aged 44, on whom Sir J. Bland-Sutton operated. The case is described in the *Lancet*, vol. i, 1900 (p. 1437). In my case the tumour measured 4 by 2½ inches, and was about one inch in thickness.

Bedford W. GIFFORD NASH, F.R.C.S.

# British Medical Association.

## CLINICAL AND SCIENTIFIC PROCEEDINGS.

### KINGSTON-ON-THAMES DIVISION.

AT a meeting of the Kingston-on-Thames Division, held at the Surbiton Hospital on November 11th, a paper was read by Mr. FREDERICK HOBDAY, C.M.G., honorary veterinary surgeon to the King and President of the Comparative Medicine Section of the Royal Society of Medicine.

Mr. Hobday took as his subject the value of collaboration between the medical and veterinary professions for the eradication of anthrax and tuberculosis, using rabies as an example of the value of stamping out a disease from animals, and so abolishing hydrophobia in man. Glanders, similarly, should soon be relegated to the category of diseases which students could only study from textbook descriptions; twenty-five years ago nearly 2,000 horses were destroyed for this disease in the London area; in the present year there had been only one horse destroyed in the whole of Great Britain. Both rabies and glanders were transmitted to man primarily through the agency of an infected animal, and the disease was diagnosable and preventable in these animals only by the trained veterinary surgeon. So long as co-operation between the medical and veterinary professions continued, and legal regulations were loyally observed, neither glanders nor rabies would regain a footing in this country as diseases affecting man.

Passing to anthrax, the lecturer remarked that this also was a disease of animal origin, to be dealt with in the first instance by the veterinary surgeon. The difficulties were greater in this case, since ruminants, which were the chief source of the disease, furnished the world with many more useful products than did the horse and dog. Food, hides, hair, wool, and bone manure for land fertilization, were all essential and in everyday use. Moreover, the longevity of anthrax spores and vitality of the bacilli rendered it difficult to ensure the safety of land where anthrax carcasses had been buried. Sir John Moore, in a recent paper before the Royal Society of Medicine, had illustrated this point from his experience in India, where it had been found that ground so infected could never be used for grazing. The compulsory destruction of such carcasses by burning, now in force in this country, appeared to be the only safe way of dealing with the difficulty. At the International Labour Congress, held in Geneva in 1921, an International Committee had been appointed to consider the disinfection of wool and hairs infected with anthrax; the effective methods of preventing infection among flocks; and the possibilities of dealing with infection by anthrax from hides, skins, and other material. Statistics indicated that infection was often derived from foodstuffs, such as cottonseed and linseed cake; but no way had yet been devised to disinfect these thoroughly without destroying their nutritive properties. With regard to wool and hair, the experimental disinfection station at Liverpool, which commenced work in July, 1921, and through which all such products entering this country had to pass, had proved very successful. The formaldehyde treatment to which anthrax-infected wool was subjected there had reduced the danger of infecting the human workers. This station, erected at a cost of over £100,000, could turn out some six million pounds of clean wool annually, and was equally applicable for the disinfection of horsehair, so that a very great improvement had been made during the past two or three years in diminishing the risk of what was once considered an invariably fatal disease. Sclavo's serum—the sheet-anchor in human treatment—was unreliable for animals, and in horses and cattle the disease still remained one of the most rapidly fatal of all microbic diseases. When it could be eradicated from the category of animal infection its abolition as a disease affecting man would automatically follow—another instance of the necessity for close co-operation between the medical and veterinary professions.

In regard to tuberculosis, Mr. Hobday pointed out that authoritative statements had assigned no less than 85 per cent. of cases of tuberculous cervical glands in children to a bovine origin; that over 10,000 children died annually owing to tuberculous milk; and that there were fully a million tuberculous cattle in Great Britain. At present, with the exception of certain cities, there was practically no veterinary inspection of cows and cowsheds; even when a cow was detected with a tuberculous udder there was no legal compulsion for the slaughter of the animal, which might be transferred to a neighbour or sold in the open market. A resolution pleading for the reintroduction of the Animals Tuberculosis Order, suspended in 1914, had been sent to the Government by the National Veterinary Medical Association and by many of its branches. Under this Order it was compulsory for an animal with a tuberculous udder to be destroyed, compensation being paid to the owner. Although the destruction of every tuberculous cow would be impracticable at the present time for financial reasons, yet the re-establishment of this Order would prevent much disease in children. In a paper read before the Section of Pathology at the Annual Meeting of the British Medical Association at Glasgow in July, 1922 (reported in the JOURNAL of November 18th, 1922, p. 955), Mr. Hobday had drawn attention to a new method of immunization of calves introduced by Dr. Nathan Raw, the then president of the Tuberculosis Society of Great Britain and Ireland. In the *Veterinary Journal* for November of this year Dr. Raw had published details of the results in a large pedigree herd during the past two years; all the calves had been vaccinated and afterwards tested regularly with tuberculin, and had passed successfully; this being in marked contrast to the former experience of the owner concerned, who had previously found reactions to be numerous. Mr. Arthur Payne, of Weybridge, had also obtained similarly satisfactory results. In 1921, 50 per cent. of a pedigree herd under his care had reacted to the tuberculin test; in 1923, 15 per cent. reacted; in October, 1923, 10 per cent.; in April, 1924, 5 per cent.; and in October, 1924, there were no reactions. Dr. Raw stated that animals so treated were able to resist invasion by the tubercle bacillus. Mr. Hobday felt that the combination of Dr. Raw's method of immunizing with the reintroduction of the Animals Tuberculosis Order would stamp out tuberculosis in cattle and be of enormous value in counteracting tuberculosis in children.

At the conclusion of the meeting Dr. N. C. CARVER proposed, and Mr. N. M. GOODMAN seconded, the following resolution, which was passed without dissent:

> "That the prevalence of tuberculosis in cattle in this country continues to be a serious menace to the health of human beings, and that to counteract this danger the reintroduction of the Animals Tuberculosis Order, which was suspended in 1914, is urgently needed."

# Reports of Societies.

### NON-TUBERCULOUS MENINGITIS.

A JOINT meeting of the Sections of Medicine, Otology, Neurology, and Pathology of the Royal Society of Medicine was held on December 10th, with the President of the Section of Medicine, Dr. ROBERT HUTCHISON, in the chair.

Dr. J. H. THURSFIELD, who opened the discussion on the causes, early recognition, and treatment of non-tuberculous meningitis, said that the extensive practice of lumbar puncture during the past twenty-five years had added greatly to their knowledge of the pathology of these conditions. He regarded the cases classed as meningismus, in which the symptoms and clinical signs of meningitis were present yet the cerebro-spinal fluid showed no changes, as early cases of true meningitis where the defensive mechanism was sufficient to overcome the infection. The same happy result sometimes occurred in cases of frank meningitis, particularly in those of aural origin with purulent cerebro-spinal fluid. There followed the difficulty of separating the severe and dangerous cases of meningitis from those which would recover practically spontaneously. The symptoms and signs of meningitis were those of cerebral disturbance; headache, vomiting, delirium, coma, together with squints, transient palsies or clonuses, and Kernig's and Brudzinski's signs might all occur in the course of any acute non-meningeal infection. Definite changes in the cerebro-spinal fluid in the direction of increase in albumin and cell

content occurred in cases of focal infection in proximity to the meninges as well as in the meningitis of mumps. Apart from the tubercle bacillus and meningococcus, which were omitted from the discussion, nearly every known organism had on occasion been responsible for a meningeal infection; the commonest were the streptococcus, pneumococcus, and *B. influenzae*, but *B. coli communis*, *B. typhosus*, the gonococcus and staphylococci, and various forms of streptothrix also occurred. In most cases there was a primary focus of infection in the ear, nasal sinuses, bones, or viscera, but the pneumococcal and influenzal forms of meningitis were generally primary. As to treatment, any primary focus discovered should be dealt with surgically, and in the absence of such focus something could be done by the exhibition of a sensitized vaccine or blood transfusion from an immunized donor. Cases of mild streptococcal infection often recovered after repeated lumbar puncture alone.

Sir WILLIAM MILLIGAN said that meningitis was a frequent complication of septic middle-ear disease, and that 5 to 6 per cent. of all cases of meningitis admitted to his hospital were of otitic origin. In the early stages of otitic meningitis there was little to indicate the onset of the disease beyond a rise of temperature to 101° to 102° F., with perhaps a rigor; later the signs of cerebral pressure became manifest. Meningeal infection began in the immediate neighbourhood of the primary focus, hence the importance of performing a radical mastoid operation, even in acute cases, in order that all the usual paths of infection might be carefully scrutinized; this in itself was often sufficient to ward off an impending meningitis. Sir William Milligan considered that three types of otitic meningitis should be differentiated: (*a*) the serous, with a sterile, though often turbid, cerebro-spinal fluid (meningitis benigna); (*b*) a type in which the cerebro-spinal fluid was rich in cellular contents but showed no viable organisms (meningitis semi-maligna); (*c*) a type similar to type (*b*), but with living organisms present in the fluid (meningitis maligna). An accurate diagnosis of the type of meningitis, upon which the prognosis was dependent, could only be made by an examination of the cerebro-spinal fluid. The fluid should, when possible, be obtained from the immediate neighbourhood of the primary focus, since that obtained by lumbar puncture might exhibit less marked changes. Cases of meningitis serosa usually recovered, but the prospects of recovery in meningitis semi-maligna or maligna (for the latter was usually the end-result of the former) depended upon the success obtained in providing sufficient drainage of the subarachnoid space and cisternae, as well as the removal of the primary source of infection. When the symptoms suggested implication of the cisterna pontis the dura in the neighbourhood of infection should be exposed and punctured, and the fluid examined. If organisms were found in the fluid drainage should be provided by tubes or strands of gauze. In the cases where labyrinthitis was the primary source translabyrinthine drainage was the operation of election. In advanced cases of leptomeningitis the prognosis was extremely grave. *Post-mortem* examination showed that the cisternae were invariably infected, and suggested that in the treatment of this condition efforts should be made to drain the cisterna pontis, the cisterna basalis, and the cisterna magna. In conclusion, Sir William Milligan urged that operation should be undertaken in all cases of septic meningitis of otitic origin; in the past many lives had been lost by regarding the condition as hopeless, and operation, in consequence, uncalled for.

Dr. C. WORSTER-DROUGHT pointed out that syphilitic meningitis, which might supervene within a few months of the primary infection, gave rise to similar symptoms and changes in the cerebro-spinal fluid to those of tuberculous meningitis, from which it might be distinguished by the Wassermann reaction and the results of treatment, since the prognosis in syphilitic meningitis was very good. He had seen meningitis connected with the ear, nose, and throat: (1) after nasal operations, (2) secondary to intranasal or sinus disease apart from operation, (3) following wounds of the jaws, (4) secondary to suppurative otitis media. In one remarkable case of meningitis associated with *B. fusiformis* no primary focus was found at the *post-mortem* examination other than pyorrhoea alveolaris. He considered the following to be the most valuable signs:

1. Rigidity of the posterior cervical muscles.
2. Kernig's sign.
3. The pulse-temperature ratio—a comparatively slow pulse associated with high temperature.
4. Delirium or stupor with irritability.
5. In infants, bulging of the anterior fontanelle.

Head retraction he regarded as useless as a sign, and Brudzinski's sign as of less importance than Kernig's. No reliance could be placed upon the reflexes for early diagnosis, but intense mental irritability accompanied by stupor was a valuable sign. The diagnosis could, of course, only satisfactorily be established by examination of the cerebro-spinal fluid. Two principles governed the treatment of all forms of non-tuberculous meningitis: (1) the establishment of efficient drainage of the meningeal exudate, and (2) the application of a specific immune serum as closely as possible to the inflamed tissues. The first could be attained in most cases by repeated lumbar puncture, but in a few cases puncture at a higher level was called for, either in the cervical region, or puncture of the cisterna magna, sphenoidal puncture through the orbit, or puncture of the lateral ventricles. The second principle required the daily introduction of serum into the subarachnoid space by lumbar puncture, since, if administered intravenously, the immune serum did not reach the cerebro-spinal fluid in any appreciable concentration.

Dr. J. G. GREENFIELD spoke of the difficulties of the pathologist in dealing with the cerebro-spinal fluid obtained from suspected cases of meningitis, since there were a multitude of tests and reactions and only a limited quantity of fluid. The problem was to attempt to arrive at a diagnosis and prognosis in two types of case: first, those yielding a clear fluid yet exhibiting signs and symptoms of meningitis; and secondly, those in which there was a purulent exudate without signs of the disease, this latter being the more difficult, especially in cases associated with air sinus empyema. The prognosis in the latter type depended on whether the pus under the dura was localized or not, and could be to some extent gauged by the presence or otherwise of organisms and their nature. When a virulent streptococcus was the cause the outlook was very bad; in the case of other organisms it was better. He regarded the protein and sugar contents of the fluid as of little prognostic value, but the chloride content was of the greatest significance. Normally this was about 720 to 770 mg. per 100 c.cm. A figure of 630 to 690 indicated the danger zone, in which the patient might be expected to succumb to generalized meningitis, whereas the speaker had never known a patient to die in whom the figure remained within normal limits. Craniotomy invalidated this test, which indicated the increased permeability to sugar of the inflamed meninges.

Mr. W. M. MOLLISON, who discussed the subject of meningitis of rhinogenic origin, said that such cases might occur as the result of direct violence at operation, but more often the meningitis was a sequel of some intracranial complication of nasal disease such as pachymeningitis, cerebral abscess, cavernous sinus thrombosis, or osteo-myelitis of the frontal bone. Infection might spread from the nose to the meninges: (*a*) through gross lesions of the cribriform plate; (*b*) by direct spread or osteo-phlebitis, in which organisms had been traced in the vessels passing through bone which might appear to be normal; (*c*) by venous spread following thrombosis to the cavernous sinus and dura via (1) the ophthalmic vein, (2) the spheno-palatine vein, (3) the veins from the nose to the superior longitudinal sinus, and (4) the diploëtic veins; (*d*) by lymphatic spread, probably a fairly frequent route after nasal operations, since it had been shown that lymphatics ran with the fibres of the olfactory nerve. After a brief consideration of non-operative rhinogenic cases of meningitis, Mr. Mollison passed to the consideration of the operative cases, and quoted extensively from the literature on the subject. Almost every variety of intranasal operation had been responsible for meningitis, operations upon the ethmoid being the most frequent cause. Though the prognosis of post-operative meningitis was extremely bad, a few cases of recovery had been reported. The speaker himself had

been fortunate in having only one fatal case, and two recoveries. The diagnosis did not differ materially from that of meningitis of otitic origin, and the changes in the cerebro-spinal fluid were similar. Treatment was of little avail, particularly in post-operative cases. It therefore behoved a surgeon to take all possible precautions. His own rules were: (1) never to operate when the patient had an acute cold, (2) if possible, to open all sinuses containing pus at one sitting, (3) never to leave plugs in the nose for more than twelve hours, (4) to treat the middle turbinal with care, and (5) to avoid the olfactory sulcus.

Mr. W. STUART-LOW, Mr. C. E. WEST, Dr. D. N. NABARRO, and Dr. W. E. C. DICKSON also spoke, and the PRESIDENT commented on the value of the discussion.

## SPLANCHNIC ANALGESIA.

AT a meeting of the Section of Anaesthetics of the Royal Society of Medicine on December 12th, Mr. O. S. HILLMAN read a paper on splanchnic analgesia.

Mr. Hillman stated that Crile's method of anoci-association, which aimed at cutting off nerve stimuli and sensations by means of local infiltration of the area to be operated upon, had its limitations, and perhaps also its disadvantages. The method to be described was regional splanchnic block, the splanchnic nerves on each side being reached by the posterior route; the needle was inserted below the twelfth rib at the level of the first lumbar vertebra, and at a distance of 7 cm. or four fingerbreadths from the middle line of the spine. The needle was inserted through a wheal in the skin if the patient was conscious, but if not it was pushed in direct, in a forward, inward, and slightly upward direction, at an angle of 45 degrees with the median body-plane, to a depth of about 9 cm., when it should reach the body of the first lumbar vertebra near its anterior convexity, in front of the intervertebral foramen and behind the splanchnic nerves. After striking the bone, which should be effected with gentleness lest the point of the needle be injured, the needle was withdrawn until its point lay in the subcutaneous tissues, and was reintroduced at a smaller angle to a point 1 cm. deeper than the spot first reached. The syringe was then applied to the needle, and aspiration was attempted in order to ensure that the needle was not in the lumen of an artery or vein. A solution of 1 per cent. novocain was then inserted, and in no case was more than 5 oz. of the solution used. About 1 oz. of solution would be necessary for each side of the body. The peripheral nerves were then dealt with either by paravertebral or by abdominal blocking. It was usually advisable to administer a general anaesthetic, but a minimum would suffice. The advantages of the method were: (1) Small respiratory excursion, (2) complete anaesthesia, (3) absence of straining when there was traction of sensitive parts, and (4) marked reduction of shock. The disadvantages were: Some twenty minutes was added to the length of the operation, and there was a possibility in a lengthy operation that the field block might pass off. The advantages to the patient were that very little general anaesthetic was necessary, shock was reduced to a minimum, respiratory fatigue was abolished, there was no impairment of the general condition of the patient when the effect of the anaesthetic had passed off, there was little danger of respiratory complications following the anaesthetic, and there was usually less post-operative pain. The only disadvantages were occasional flatulent distension of the bowels, and headaches in a few cases, as sometimes occurred after spinal injections. Mr. Hillman showed photographs of the cadaver to illustrate his technique, and a number of pulse and blood pressure tracings. The latter demonstrated the fact that a fall of blood pressure occurred about twenty minutes from the commencement of the injection, and that this effect gradually diminished, so that at the end of the operation the pressure had attained or was rising to the level at which it stood prior to injection. The tracings showed also that the pulse rate did not rise in proportion to the fall of blood pressure, but remained fairly constant. The total number of cases operated upon was 48, of which 26 were for gastrectomy. The mortality was 7 cases, of which 2 had had a partial gastrectomy performed.

Mr. R. E. APPERLY then read a paper describing 43 cases of splanchnic analgesia, with a mortality of 5. Of the total operations 17 were gastrectomies, and three of these patients died. He agreed with the previous speaker regarding the advantages and disadvantages of the method. While he considered it preferable that a general anaesthetic should be given in addition to the block anaesthetic, the condition of the patient was sometimes so desperate that a general anaesthetic had to be avoided. In these cases a preliminary injection of morphine gr. 1/4 and scopolamine gr. 1/100 was administered one and a half hours before operation, and followed by a second injection of morphine gr. 1/6 and scopolamine gr. 1/200 half an hour before the block analgesic was given. In the cases where a general anaesthetic was used the preliminary injection consisted of morphine gr. 1/6 or 1/4 and atropine gr. 1/100 half an hour before operation. The general anaesthetics he preferred were gas and ether, or a mixture of chloroform and ether. In view of the preliminary fall of blood pressure he advised that care should be taken to avoid raising the shoulders. Since regional blocks could not be hurried, he emphasized the necessity of co-operation between surgeon and anaesthetist. It was necessary that the surgeon should indicate clearly the area within which he proposed to operate, and that he should confine his manipulations to the anaesthetized area unless he had warned the anaesthetist to deepen the general anaesthesia. Great care should be taken in moving patients after this type of anaesthetic. It was possible to reduce considerably the amount of novocain used, and it was perhaps best to do this by reducing the strength of the solution. Satisfactory anaesthesia could be produced with 1/2 per cent. solutions. In addition to the disadvantages mentioned by Mr. Hillman there were two others. Patients complained sometimes of backache, and Mr. Apperly had also encountered cases of regurgitation of the stomach contents when that organ was manipulated by the surgeon. If possible, in these cases a stomach tube should be passed and the stomach washed out; but this was sometimes difficult owing to the light general anaesthesia used. He had never seen any sequela to this accident.

Mr. GORDON-TAYLOR, whose patients supplied the majority of the cases under review, fully concurred with these observations, and said that the method had enabled him to perform successfully operations which he felt sure would have been fatal if performed under general anaesthesia alone. Only one patient had developed pulmonary symptoms, from which he died, and in no other case were previously existing chest troubles aggravated by the anaesthetic used. The method was a distinct advance in the art of anaesthesia; it was one which anaesthetists should take up, since the surgeon had enough responsibility already, and it was not possible in the same case to have two anaesthetists—one for the general anaesthesia and one for the block analgesia.

Mr. STANFORD CADE had employed this method in some fifty cases and always used a 1/2 per cent. solution. He emphasized the danger of novocain poisoning if even small quantities of the drug entered a vessel. Palpitation and cyanosis were the preliminary signs of poisoning, and if the drug passed into the circulation there was immediate apnoea. He showed a number of tracings from animals demonstrating the effects of injecting novocain into the circulation. In all cases the result was death, even when such small amounts as 20 minims were injected. He added that this was a quick and painless method of destroying animals.

Dr. HUGH PHILLIPS asked what was the average duration of block anaesthesia. Dr. C. F. HADFIELD asked whether splanchnic analgesia lasted longer than abdominal block analgesia, and whether fatter patients could be dealt with according to the measurements given by Mr. Hillman when inserting needles to definite depths. He also wished to know how this form of analgesia appealed to private patients. Dr. LANGTON HEWER had so far tried the method in nineteen cases; he had found that the average pulse rate in these was only 91, and that shock was much diminished.

Dr. J. BLOMFIELD was glad that no speaker had mentioned the addition of adrenaline to the novocain solution; he advocated abolishing the use of this dangerous drug.

Dr. HOWARD JONES asked whether blood was ever withdrawn after inserting the needle. Dr. H. W. FEATHERSTONE inquired if weakening of the diaphragm or massive collapse of the lung had ever been observed after splanchnic analgesia.

Mr. HILLMAN and Mr. APPERLY replied to the questions. The duration of analgesia was from one and a half to two and a half hours. The abdominal block was less persistent than the splanchnic, possibly because of the better circulation of the abdominal muscles, and partly because it was more difficult to ensure adequate analgesia of the nerves of the abdominal wall owing to the indefiniteness of the landmarks. The fatness of a patient did not render the method much more difficult, since the landmarks mentioned had to be found, and it was not hard to make allowances for the depth of tissues to be traversed before reaching the landmarks. Since in most cases an inhalation anaesthetic was given in addition to the block analgesic, private patients had no objections to the procedures adopted. On several occasions blood had been drawn into the syringe when aspirating prior to injection.

## MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH.

A CLINICAL meeting of the Medico-Chirurgical Society of Edinburgh was held on November 19th, Sir DAVID WALLACE, the President, in the chair. Among the many cases shown were the following:

Mr. QUARRY WOOD showed a patient of 21, from whom a sarcoma of the proximal end of the humerus had been successfully removed by interscapulo-thoracic amputation by the posterior method introduced by the late Mr. Littlewood.

Sir NORMAN WALKER showed a patient with leprosy, whom he had previously exhibited to the society, to demonstrate the remarkable progress she had made under treatment by a vaccine prepared from one of the excised nodules. He also demonstrated a series of cases of lupus in all stages of chronicity to illustrate the excellent results obtained by the use of artificial sunlight, far in excess of those from any other treatment he had tried. The healing scar tissue was softer and more pliable than that produced by any other method, and was therefore practically painless.

Sir HAROLD STILES showed two cases of resection of the ileo-caecal region for tuberculosis. The first patient was a woman, aged 35, who had a chronic apical lung lesion. About six months ago an anastomosis was made between the transverse colon and ileum owing to there being symptoms of chronic obstruction, and six weeks ago the resection was performed. The second patient was a girl, aged 20, a farm worker. Five years ago, resection of the ileo-caecal region and proximal colon was performed for hypertrophic caecal tuberculosis, probably of bovine origin. She also had had an anastomosis made for chronic obstruction three months before the resection operation. She looked the picture of health, and there was no lung lesion. He also showed a lad, aged 17, one month after an operation for tuberculosis of the thyroid causing much suffocation from tracheal pressure. The appearance at first sight suggested a malignant condition; tracheotomy was necessary.

Professor LOVELL GULLAND showed a female patient with pellagra, and described the etiology of the disease and its essential clinical features. This patient developed the symptoms during a "strike" time in the village where she lived; what little food she got consisted of small quantities of bread and margarine. She still had a sallow appearance, but was vastly improved in health.

Mr. SCOT SKIRVING showed again to the society a case of marked depressed fracture of the occipital bone with effusion of cerebro-spinal fluid. Three further aspirations had been necessary, and a month ago half an ounce only of cerebro-spinal fluid was removed. There had been no general or focal symptoms of any kind, and the aspirations had caused no faintness or headache. He also showed a girl, aged 3, who swallowed a hatpin about 2½ inches long. The pin had perforated the duodenum, and its point was impacted in the cortex of the kidney: its track was covered with plastic peritonitis. The pin was removed by operation and demonstrated to the society, with an *x*-ray photograph of it in the abdomen.

Dr. ROBERT A. FLEMING showed a man, aged 60, with neuro-fibromatosis of wide distribution involving symmetrical areas of the fifth cranial nerve, nerves of the scalp, cutaneous nerves of the arms, intercostal nerves, and the cutaneous nerves of both thighs. There were no lesions below the knees, and nearly all the lesions were sessile. A section of one of the tumours was shown to be almost entirely fatty in nature. The relationship between neuro-fibromatosis, lipomatosis, von Recklinghausen's disease, and molluscum contagiosum was discussed.

Dr. DOUGLAS GUTHRIE showed a man, aged 35, after total laryngectomy for epitheliomata of the larynx. A preliminary tracheotomy, together with the removal of a portion of the tumour, was effected under local anaesthesia, and the later removal of the larynx was performed under general anaesthesia. Small drains were inserted at the extremities of the lateral flaps, the wound being sutured at the operation. The patient was fed by a nasal tube kept in position for three weeks.

Mr. GEORGE CHIENE showed a male, aged 18, suffering from elephantiasis of the left leg and scrotum. The patient had never been out of Scotland. In 1914 he received an injury to the knee-joint, and the limb was in plaster for six months; the joint was excised later. In 1921 swelling of the leg began, and spread up the limb, involving the scrotum. In December, 1923, the tensor fasciae latae was exposed and three long strips of the ileo-tibial tract were cut, their bases being left intact. One was brought up on to the under surface of the abdominal wall, and the others embedded in the muscles of the thigh. Great reduction of swelling followed.

Mr. J. N. J. HARTLEY showed a miner, aged 52, admitted with symptoms of concussion following a cycling accident. He regained consciousness on the third day, and seemed to be making good progress till the tenth day, when twitchings followed headache and drowsiness. On the next morning a severe spasm occurred, affecting the whole body. The patient became unconscious, and developed complete paralysis of the left arm and leg and the left side of the face. A right temporal exploration disclosed a subdural clot extending over the cortex throughout the area exposed in the temporal fossa; a little turbid fluid was withdrawn. A film was made of this fluid part of the clot, and among the polymorphs were found a few minute Gram-positive cocci. The patient made a satisfactory recovery.

Dr. CHALMERS WATSON showed a case of disseminated sclerosis of five years' standing. The patient had twice been in hospital before, and had been discharged with slight improvement. Since June, 1924, steady deterioration had set in, and before his admission to Dr. Watson's wards he had been unable to stand or walk; he was later confined to bed or a chair. He was treated by Dr. Watson's method of combating auto-intoxication, and already showed marked signs of improvement. He was still very tremulous, but was able to stand alone with the help of a stick.

Dr. W. T. RITCHIE showed: (1) A case of acromegaly. The patient, aged 28, was 6 ft. 6 in. in height and weighed 217½ lb. He showed the features of gigantism characteristic of over-activity of the anterior lobe of the pituitary before epiphyseal union in the long bones was complete, and acromegaly, the result of the same hypophyseal disturbance after ossification of the epiphyses. He had suffered much from headaches between 11 and 16 years of age. Dr. Traquair at that time had detected some bitemporal hemianopia, which had not progressed. (2) A case of Erb's paralysis in a man, aged 29, who had been struck between the neck and shoulder by a sandbag in the trenches in 1916. Six months later symptoms began with the finding that he could not handle his rifle properly.

Dr. CHARLES MCNEIL showed: (1) A case of pyloric stenosis in a boy, aged 5 months, illustrating the importance of establishing the diagnosis early while the child was being breast-fed. The diagnosis was made when the child was a month old, at the first examination; lavage twice daily was instituted and breast-feeding continued. Progress had been slow, but quite steady. (2) A case of interlobar empyema after pneumonia in a child, aged 7 years 11 months. Repeated puncture in the lower axillary region was negative, but finally pus was obtained in the third interspace in the mid-axillary line. Five ounces were withdrawn and a cannula inserted, which was removed two days later because only serous fluid was being discharged. Radiographs illustrated the gradual disappearance of the lesion, and the final photograph showed complete resolution.

Mr. FRANCIS E. JARDINE showed a case after operation for a retroperitoneal strangulated hernia; 28 inches of gangrenous small intestine were removed, beginning about 1½ inches above the ileo-caecal junction. Inside the resected bowel a sarcomatous tumour was found, which was, no doubt, a factor in causing the hernia.

Mr. PIRIE WATSON showed a man, aged 68, after operation for the removal of a very large omental cyst which had caused singularly few symptoms. The tumour was too large to remove despite a large incision, and a trocar was passed into it, allowing 1½ gallons of haemorrhagic fluid to be withdrawn. The pathological report by Dr. James Davidson indicated that it was a malignant endothelioma with invasion of the cyst wall, and a bacteriological examination by Dr. McCallum showed the presence of *B. coli*. It was probable that the cyst had been of long standing, and had only recently taken on malignant features.

Mr. J. J. M. SHAW showed a man, aged 28, who received a shrapnel wound of the thigh in 1918. He came to the out-patient department complaining of pain in the lower part of

the thigh, and on *x*-ray examination nine and a half sewing needles were found in the left thigh. It appeared that he had put a new "housewife" into his trousers pocket shortly before being wounded, and the needles had presumably been blown into the limb, becoming dispersed in the muscles.

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A MEETING of the Plymouth Medical Society was held on November 25th, the President, Mr. C. L. LANDER, in the chair. Mr. C. HAMILTON WHITEFORD read a paper on some unusual surgical cases. The list of cases was: Death in convulsions during chloroform anaesthesia; intraperitoneal rupture of the bladder; epithelioma of the penis following incomplete circumcision; exstrophy of the bladder in an adult; failure of union between the vas deferens and the testicle; epithelioma of the tongue in a woman of 25; adenoma of the umbilicus; enterospasm of the small intestine, involving a long segment of bowel; strangulation of the descending colon in a right femoral hernia; sarcoma of the rectum; carcinoma of the rectum occurring simultaneously in husband and wife; complete tear (non-obstetrical) of perineum, causing rectal incontinence; pyophysometra. A discussion followed, in the course of which Mr. H. F. VELLACOTT and Mr. J. W. G. H. RIDDEL mentioned a case of two girl friends of 18 and 21 who had occupied the same bed and were both found to be suffering from carcinoma of the rectum.

# Reviews.

## PNEUMONIA.

AT the time of the late Dr. R. MURRAY LESLIE's death, in March, 1921, it was stated in our columns (1921, i, 548) that he had completed a work on pneumonia and its modern treatment for the Oxford Medical Press. Dr. J. BROWNING ALEXANDER has now revised and edited the posthumous book and brought it out under the title *Pneumonia: its Pathology, Diagnosis, Prognosis, and Treatment.*[1] From the editor's preface it appears that in the original form of the work much more importance was attached to vaccine treatment than the author would probably have thought judicious had he survived to the present day; accordingly, much that was then written has been modified or omitted, and considerable additions have been made in the chapters dealing with bacteriology. It may be said at once that the result of Dr. Browning Alexander's editing has been successful, and that there is thus provided a good general review of pneumonia and bronchopneumonia, with evidence of wide reading and numerous quotations from the writings of others, including the author's three "chiefs" at the Brompton Hospital for Consumption and Diseases of the Chest—Dr. J. Mitchell Bruce, Sir James Fowler, and Dr. Percy Kidd—to whom it is piously dedicated. The ground covered is large, and it is convenient to have the subjects—which are included, of course, in textbooks and treated individually in scattered papers, but seldom made the object of a monograph—between the covers of a well printed volume.

In addition to ordinary pneumonia, there are chapters on influenzal pneumonia, pneumonia in children, and surgical (post-operative) pneumonia. The account of the lung complications of influenza appears to be based largely on the discussion that took place at the Royal Society of Medicine in November, 1918, and it might have been well to have referred, especially in the sections on the vexed question of the bacteriology and on the morbid anatomy, to Dr. Crookshank's *Collected Essays on Influenza* (1922), and to the reports from the American camps, particularly to those by W. G. MacCallum and E. L. Opie. It is, of course, difficult to include every opinion, but it may be noted that the late G. A. Gibson's attractive dictum (1908) that the arterial blood pressure expressed in millimetres of mercury should not fall in pneumonia below the pulse rate expressed in beats per minute has, even with the admitted exceptions, hardly met with universal confirmation; for Newburgh and Minot (1914) in America, and Geoffrey Evans (1920) in this country, have found that the blood pressure was higher in the fatal than in the surviving cases of pneumonia. The account of the treatment of pneumonia is commendably full, and contains a good description of the use of digitalis, the observations justifying its employment, made at the Rockefeller Hospital, New York, being quoted; strychnine is also recommended, in spite of some adverse opinions, as of great value in a failing heart and falling blood pressure. The uses and common mistakes made in the technique of oxygen inhalation are discussed in a thoroughly practical manner.

In conclusion it may be said that this work will serve as an extremely useful source of reference to medical practitioners.

[1] *Pneumonia: its Pathology, Diagnosis, Prognosis, and Treatment.* By the late R. Murray Leslie, M.A., B.Sc., M.D. Edited and revised by J. Browning Alexander, M.D., M.R.C.P.Lond. London: William Heinemann (Medical Books), Ltd. 1924. (Demy 8vo, pp. xiv + 351. 12s. 6d. net.)

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## THE PRINCIPLES OF BIOCHEMISTRY.

OPIE, when questioned, said he mixed his paints with brains; the author of *Principles of Biochemistry*[2] may be said to have mixed his with philosophical common sense. The result is very satisfactory, for we have a series of essays on the various aspects of vitality rather than a catalogue of unrelated statements about chemical substances. Professor BRAILSFORD ROBERTSON uses his chemical knowledge to interpret function rather than isolate from each other in two watertight compartments all he knows about chemistry and physiology respectively.

The author's treatment of the part played by inorganic substances in the body may be cited in illustration of this. Instead of an enumeration of the inorganic salts in the tissues, blood, and urine, we have in Chapter II an illuminating account of the physiological importance of water, sodium chloride, calcium, and iron. And the treatment is not elementary; it is taken for granted even so early in the book that the reader is familiar with nucleo-proteins, "haematogen," scurvy, anaemia, chlorophyll, and selective absorption in the thyroid. Nor does this exhaust the subject, for under the heading "Effects of the disturbance of the inorganic environment" the author later on returns to his thesis of the enormous importance of inorganic materials. Professor Robertson quite candidly announces that in order to comprehend the biochemistry of to-day the student must have had some training in the use of the differential and of the integral calculus, and have read something on the method of least squares, the theory and practice of interpolation, the theory of statistics, and the conception of probability. The sections into which new matter has been incorporated since the first edition are those on—neutrality of the blood, metabolism in diabetes, and the biochemistry of growth. Certain subjects are now treated for the first time; these include the relation of growth to diet, the racemized proteins, the nucleic acids, and the inclusion of the environment in evolution.

The chapter on "Chemical correlations," instead of being a summary of other people's work on the internal secretions, is a masterly survey of the whole field of endocrinology, but we are surprised to find only the barest reference to insulin, a substance fully proved to be of the highest importance for carbohydrate metabolism, and one discovered, to boot, in Professor Robertson's old University of Toronto.

The second part of the book is wholly occupied with a valuable discussion particularly illuminating for all students of physiology. At the same time, no artificial line is drawn between the facts of physiology and pathology, so that we find such subjects as the production of antiserums and the theory of antigens ably treated. Where so much else is to be found in this large volume, we are disappointed to note that certain topics are virtually ignored: these include filtration through compressed clay filters, the reducing powers of the tissues, and latent life. Rectal feeding is not fully discussed. Even so original a writer as Dr. Robertson does not attempt to deal with the problem of the reality of nerve energy, surely in the last analysis a chemical one. This is the more curious as he does treat of sleep and memory. It seems to us that "phase" is a better term than "cycle" to describe the waves or oscillations on the curve of the growth of the individual, and we also think that of the two phrases, "inertia" or "lag" (on page 555), the former, when referring to functional or physiological inertia, is to be preferred.

[2] ***Principles of Biochemistry for Students of Medicine, Agriculture, and Related Sciences.*** By T. Brailsford Robertson, Ph.D., D.Sc. Second edition. London: Baillière, Tindall and Cox. 1924. (Roy. 8vo, pp. xii + 736; 57 figures. 35s. net.)

The text is not interrupted by footnotes, but all the titles of papers referred to are classified in a convenient fashion at the end of each chapter. The illustrations mainly consist of curves; but there are one or two excellent photographs of cases of disordered internal secretion.

There are two indexes—one of subjects and the other of authors.

The printing is excellent, and the use of heavy type to indicate topics under discussion has much to commend it, but the paper is so heavy that the book cannot be held in the hand without fatigue.

## MENTAL NURSING.

IN addition to the regular course of instruction given to the staff of The Retreat, York, it has been the custom for some years to ask well known psychiatrists to give addresses at the hospital on topics connected with mental nursing. These lectures, fifteen in number, have now been arranged and edited by Dr. BEDFORD PIERCE, and published in a volume entitled *Addresses to Mental Nurses*.[3] Perhaps the most noteworthy feature of these addresses is the atmosphere of idealism with which they are permeated. Nearly all the speakers emphasize the fact that the care of the insane, which is certainly one of the most exacting and difficult tasks which anyone can undertake, requires not only technical knowledge but a spirit of service as well. Several of the addresses, indeed, are largely concerned with a study of the character traits which are an essential part of the equipment of those who aspire to be successful mental nurses.

We regard this book as an important addition to the literature of mental nursing. It is a work which every mental nurse would do well to possess as a supplement to the ordinary textbook; for not only does it furnish a great deal of practical information, but it encourages an attitude of optimism and hopefulness in a sphere of activity which is liable to provoke despondency. Five of the contributors to this volume—namely, Dr. David Yellowlees, Sir Thomas Clouston, Dr. Charles Mercier, Sir George Savage, and Dr. James Middlemass—have died in the last few years, and it is satisfactory to know that their teaching will still continue to inspire the work of the present and coming generations of mental nurses.

## INDUSTRIAL FATIGUE.

MUCH interest has been taken in recent years in the study of fatigue, especially in relation to problems of industrial efficiency. Numerous tests of fatigue have been proposed and practised. They are of two categories. One set of tests is concerned with the study of fatigue in the individual, and includes both physiological and psychological tests. The other is concerned with fatigue in the mass, and is based on deductions made from industrial phenomena which may be looked on as representing the total individual fatigue reactions. Dr. DHERS, who has written a small book entitled *Les Tests de Fatigue*,[4] is sceptical of the practical value of fatigue tests. He does not consider that the sensation of fatigue is in any way a reliable index of the presence of real fatigue.

In the first part of the book we have a detailed consideration of the several tests in use. Dr. Dhers is a keen critic and indicates many fallacies in them. In the second part, after enumerating the many factors productive of fatigue in industrial work, he goes on to consider its supposed sequelae (diminished output, etc.). Dr. Dhers contends that the value of such methods of inquiry is limited, and deprecates hasty conclusions. He considers that the problem of fatigue tests is essentially limited by our ignorance of the underlying biological phenomena.

Dr. M. H. PIÉRON, Professor of Experimental Psychology in the University of Paris, in an excellent preface, deservedly congratulates Dr. Dhers on having set out clearly the real problems involved. Thus only can real progress be made.

[3] *Addresses to Mental Nurses.* Edited by Bedford Pierce, M.D.Lond., F.R.C.P.Lond. London: Baillière, Tindall and Cox. 1924. (Demy 8vo, pp. 288. 7s. 6d. net.)

[4] *Les Tests de Fatigue: Essai de critique théorique.* Par Dr. Victor Dhers. Préface de M. H. Piéron. Paris: J. B. Baillière et Fils. 1924. (Roy. 8vo, pp. xii + 185. Fr. 14.)

## A FAITH-HEALING NOVEL.

NOT a few eminent authors have had a medical training when young. But it is rare to find a busy medical man who is also a novelist. Professor F. E. WYNNE, M.O.H. Sheffield, is one of those who combine the two occupations, and following his earlier novel, the *Mediterranean Mystery*, he has now produced *Digby's Miracle*.[5] The subject of the book is appropriate to the present time when newspaper columns are filled with the marvels of faith healing; and it is perhaps useful that the cold douche of comedy should be applied, by one who has been trained in medicine, to the fiery enthusiasm of faith healers. Margaret Hesford, who had been stricken with paralysis at the age of 12 years, is 20 when the novel begins. During the eight years that she had lain in bed she had become the local saint of the uninteresting village of Kinderwell. Into this village there comes the young Dr. Digby, compelled by lack of means to abandon his ambition to do research work in a London hospital. He discovers that the paralysis is simply hysterical, but is faced with difficulty in adopting treatment—difficulty due partly to the inconvenience of destroying in a moment the saint's reputation in the small village, but arising even more out of pity for the girl's mother, one of the few unselfish characters in the book, who has slaved for eight years in her daughter's interest. In this dilemma the doctor hits upon the idea of making a miracle of the cure; the patient is carried in her spinal carriage to a disused well, labelled for the occasion St. Kilda's Well, with a suggestion that from it the village derived its name; and with a glass of water from this well an immediate cure is effected. Unfortunately, Dr. Digby's ingenuity leads him into a series of troubles: the prickings of conscience, love-making, and later hate on the part of his patient; and, most embarrassing, booming of the miracle by the press throughout the country. Kinderwell is thronged by the sick; further miracles are reported; the fame of the cures spreads; publicans, Jews, reporters, and a disreputable ex-gaol-bird of a revivalist who starts the singing of hymns at the well, all take a hand in the organization of the healing business. Dr. Digby ends by falling in love with a charming female reporter, whose disillusionment is great when she learns all about the doctor's deception. But the *deus ex machina* in the shape of Lord Altadore, the landowner of Kinderwell, sets matters right, and finally disposes of the miracle-working well by sending for geological experts, who successfully drain it away.

The story is amusingly told, but perhaps is almost overladen with cynicism. The character of the paralysed girl puts a strain upon one's credulity. Professor Wynne appears to suggest that she knowingly practised fraud from the age of 12. Her proceedings when cured are by no means saint-like. But it is difficult to believe that after lying in bed for eight years she should have been able, at the age of 20, so to impress a Jew film producer with her powers as an actress that he forthwith engaged her for a cinema production. Possibly Professor Wynne wished to eliminate an undesirable aspirant for Dr. Digby's love in favour of the later introduction, the reporter Lucretia Bourne. The author's style and views may perhaps be illustrated by such remarks as these: "Nationalization would divert the profits from one set of pockets to another." "Talking politics is generally a swopping of catchwords." "As far as I can make out, 'democracy' is a system of counting heads and ignoring their contents."

## NOTES ON BOOKS.

AT the age of 87 Dr. W. W. KEEN of Philadelphia has produced his "Religio Medici" under the title *Everlasting Life*.[6] As a boy Dr. Keen was brought up a member of the first Baptist Church. His imagination was affected by prophecies of the "second Advent," which was to occur in 1843 and usher in the millennium. The excitement caused by these prophecies was intensified by various unusual appearances in the heavens—mock suns and the great comet of 1843. But as he grew older his idea of a revengeful God became modified, and building on a text which he describes as the

[5] *Digby's Miracle.* By Fred E. Wynne. London: Herbert Jenkins, Ltd. 1924. (Cr. 8vo, pp. 310. 7s. 6d. net.)

[6] *Everlasting Life: A Creed and a Speculation.* By W. W. Keen, M.D., LL.D. London: J. B. Lippincott Company. 1924. (Cr. 8vo, pp. 86. 4s. 6d. net.)

glorious Christian Magna Charta, he gives his views of the essentials of Christian belief. Without disputing the faith of those who think otherwise, Dr. Keen finds no demand for belief in a miraculous virgin birth. To him Nature is only another name for God. He regards the Incarnation and the Atonement as essential to faith, which to him is as much a normal function of the human mind as is logic. Being convinced of immortality the author concludes with a speculation on "How shall we spend our time in heaven?" The little book is the work of an earnest and simple-minded Christian, well versed in scientific knowledge, who finds no difficulty in reconciling the discoveries of science with the essential beliefs of the Christian religion.

We welcome the appearance of a cheaper unabridged edition of the late Dr. R. W. S. BISHOP'S book entitled *My Moorland Patients*,[7] the first edition of which we reviewed some years ago (JOURNAL, June 3rd, 1922, p. 878). By its happy combination of lively humour, keen sympathy, and sombre realism the work deserves to become a classic of its kind.

We have received a copy of a short memoir of the late Dr. Thomas Bodley Scott,[8] who was mayor of Bournemouth at the time of his death. An obituary notice appeared in our issue on February 16th last. The little work, which has been edited by "W. A. F." and "G. R. D.," contains chapters on T. B. Scott, the Doctor, by Dr. E. Hyla Greves; His Religion, by the Rev. E. Moor; and His Writings, by G. R. Dennis; as well as a short account of his public work.

The first issue of the *Revue Franco-Russe de médecine et de biologie*,[9] a new monthly journal edited by Drs. L. HACHLOV, I. LEVITCH, Z. REICHNER, and A. ROUBAKINE, contains original articles by Professor Diakonoff on a new anthropometric method, by Professor Sémaschko on hygiene in Soviet Russia, and by Dr. Dobreitzer on malaria in Russia, an account of the third Pan-Russian Congress for Combating Tuberculosis, and abstracts from Russian journals, and medical news.

The sixty-fourth issue of the *British Journal Photographic Almanac*[10] for 1925 is again edited by Mr. GEORGE E. BROWN, who contributes to it a valuable article entitled "The plain facts of lenses." Another article, by Mr. T. L. J. Bentley, contains a useful discussion of the small camera, with many practical hints. The present issue contains several new features and is larger than its predecessors, more pages being added to the text and reviews of many improvements in apparatus and materials being included. A series of short articles dealing with the properties of chemical substances used in photography is particularly helpful. The table of exposures has been extended to apply to countries in every latitude, and the book can be confidently recommended; the price is not increased.

A volume containing the *Transactions* of the Tenth Annual Conference of the National Association for the Prevention of Tuberculosis[11] has been published. This conference was held on July 3rd and 4th, 1924, and was reported in our columns of July 12th (p. 61). It was chiefly occupied with the consideration of training colonies and their place in the tuberculosis scheme.

[7] *My Moorland Patients.* By a Yorkshire Doctor (the late Dr. R. W. S. Bishop). Cheaper unabridged edition, edited by J. C. Powell. London: John Murray. 1924. (Demy 8vo, pp. x+242; 4 plates. 7s. 6d. net.)

[8] *Thomas Bodley Scott, Mayor of Bournemouth.* Bournemouth: Ernest Cooper. 1924. (Cr. 8vo, pp. 45; portrait. 1s. net.)

[9] *Revue Franco-Russe de médecine et de biologie.* Paris: Société d'éditions scientifiques "France-Russie." (Subscription: France, fr. 30; Union Postale, fr. 40; single copy, fr. 4.)

[10] *The British Journal Photographic Almanac.* Edited by George E. Brown, F.I.C., Hon. F.R.P.S. Sixty-fourth issue. London: H. Greenwood and Co., Ltd. 1925. (Sup. roy. 16mo, pp. 814; illustrated. Paper, 2s. net; cloth, 3s. net.)

[11] *Transactions of the Tenth Annual Conference of the National Association for the Prevention of Tuberculosis.* London: National Association for the Prevention of Tuberculosis, 20, Hanover Square, W.1. 1924. (Cr. 4to, pp. xxiii + 76. 6s., post free.)

## THE LEAGUE OF NATIONS HEALTH COMMITTEE.

THE League of Nations Health Committee held its third session in Geneva from September 29th to October 4th. Sir G. S. Buchanan, C.B., M.D., represented Great Britain. The committee adopted a report prepared by the subcommittee it had appointed at the request of the Advisory Committee on Traffic in Opium and of the Preparatory Committee for the International Opium Conferences. This report gives information in support of the estimated figure of 450 milligrams of raw opium and 7 milligrams of cocaine per inhabitant per year as the maximum for legitimate requirements of European countries possessing a well developed medical service. The Health Committee further decided to request the opinion of medical practitioners in different countries as to whether the therapeutic value of heroin is sufficient to outweigh the social dangers which its abuse entails. It recommended that propaganda against the abuse of cocaine and morphine should be confined to doctors and medical students, as it might otherwise do more harm than good by arousing unhealthy curiosity; and that preparations containing less than 0.2 per cent. of morphine or 0.1 per cent. of cocaine or heroin should also be included in the provisions of the Hague Opium Convention. The Health Committee approved the report submitted by the joint committee formed by members of the International Labour Office and the Health Committee to study the question of the disinfection against anthrax of leather and hides. The report recommends that members of the joint committee should study in their own countries the various methods of disinfection with a view to comparing their value, and that national committees should be formed in Belgium, France, Germany, Great Britain, and perhaps Switzerland and the United States, for conducting further investigations. The liaison between these organizations and the joint committee should be assured by the International Labour Office.

The Health Committee, in pursuance of the proposal submitted by the Dutch Government relating to the simplification of quarantine and clearance formalities, decided to frame a model convention that might serve as a basis for the conclusion of special conventions whose purpose it would be to eliminate the unnecessary repetition of sanitary measures on ships. The Dutch and Belgian Governments opened forthwith negotiations for the conclusion of a convention of this kind.

The committee adopted the report of its subcommittee on health instruction, suggesting a course of study for 1925, to comprise, notably, the collection of information relating to instruction in health matters for medical students and medical experts in European and, perhaps, also in Canadian and American universities.

The Malaria Commission submitted a provisional report on its investigation in Bulgaria, Greece, the Kingdom of the Serbs, Croats, and Slovenes, Rumania, Russia, and Italy. The final report, which is being prepared for the end of this year, will contain exhaustive information as to the incidence of malaria and the methods used to combat it in all the countries visited. At the same time the Health Committee considered the first reports of its small committee of experts on the problem of quinine, and decided to recommend that attempts should be made in Algeria, Spain, Italy, and Rumania to try the effect of the various cinchona alkaloids. The experiments will be carried out under the auspices of the League Malaria Commission, and with the aid of material furnished by it so as to ensure uniformity of conditions. Further, the Malaria Commission will continue its study of the incidence of malaria in Europe by establishing contact with experts and corresponding members, and by investigations in Sicily, Tunis, Algeria, Morocco, Spain, and Portugal during 1925.

The committee, after considering the report submitted by its subcommittee on sleeping sickness and tuberculosis in equatorial Africa, asked the Council to recommend to the Governments concerned that they should encourage conferences between governors and health officials in the affected territories, as well as organize a regular interchange of information on all matters concerning the spread and incidence of sleeping sickness. The committee drew attention to the desirability of maintaining a medical service proportionate to the population and areas to be dealt with, and recommended a programme of technical research with regard to certain questions connected with the origin and spread of sleeping sickness.

The Health Committee approved the preparatory work for the opening of the Epidemiological Intelligence Office at Singapore, and notably the organization of a conference of health officials to be held in Singapore at the beginning of next year, at which Dr. Norman White will attend on behalf of the League Health Organization.

The committee instructed the Health Section of the Secretariat to prepare a preliminary report to serve as a basis for the adoption of a programme of investigation with regard to an antituberculosis campaign as requested by the Fifth Assembly, and asked its presidents and vice-presidents to keep in touch with the preparatory work. A suggestion of the Japanese member that the Health Committee should investigate the standardization of tuberculin and study the methods for the preventive and early treatment of tuberculosis was adopted, the question of tuberculin being referred to the permanent subcommittee on the standardization of serums and serological tests.

The Health Committee, in approving the system of interchange organized for the year 1925, paid special attention to the arrangement of a South American interchange, in which ten health officials from South American countries, appointed by their respective health administrations, should study the working of the American, Canadian, British, and two or three Continental health services under the auspices of the League Health Organization.

British Medical Journal.

SATURDAY, DECEMBER 20TH, 1924.

## RADIUM THERAPY.

SHORTLY after the armistice the Government found itself in possession of a stock of radium bromide. It was decided that it should be applied to the purpose of medical research, and the Medical Research Council has since been carrying that decision into effect. The stock consisted of nearly five grams of hydrated radium bromide, or about two and a quarter grams of radium element. It had been collected by the Ministry of Munitions from innumerable gun sights, watch dials, and other instruments of war. The whole quantity of radium salt thus made available for research was at first handed over to the Middlesex Hospital in order to institute an inquiry into the curative value in malignant disease of penetrating radiation of extremely short wave-length, like that of the gamma rays of radium. A report on the preliminary researches was issued in 1922, and its general conclusions were noted in our pages of March 11th, 1922 (p. 405). Subsequently the Medical Research Council distributed the radium salt among nine research centres—five in London, one in Birmingham, one in Cardiff, one in Aberdeen, and one in Dublin. In addition, fractions of the salt were allocated for purely experimental work to the Radium Institute, London, and the Cavendish Laboratory, Cambridge. Preliminary reports from the centres down to the end of 1922 were collated and a summary printed, which was issued to those engaged in the investigations and to others specially concerned. The Medical Research Council has this week issued a report[1] consisting of summaries of reports on the work in the research centres during 1923. The report contains three sections: the first deals with clinical investigations on malignant disease; the second with clinical investigations on non-malignant conditions; and the third with experimental investigations. The whole report is of a preliminary nature, and it is obvious that clinical results can only be gauged after the expiration of several years.

The report has been prepared by the Radiology Committee of the Council, which consists of Sir Cuthbert Wallace (chairman), Dr. Arthur Burrows, Mr. Malcolm Donaldson, F.R.C.S., Mr. Thurstan Holland, M.Ch., Professor E. H. Kettle, M.D., Dr. Robert Knox, and Sir Humphry Rolleston, with Professor Sidney Russ, D.Sc., as secretary. It consists mainly of extracts from reports supplied from the various centres, but the Committee has ventured on certain tentative conclusions; one of these conclusions is that in the treatment of cancer of the cervix of the uterus radium is an agent of unquestionable value. Dr. R. T. Lewis, from his experience at University College Hospital, states that when ulceration is limited to the vaginal portion and growth spreads through the cervix—as, for instance, when it starts in the endocervical epithelium—the results have frequently been most satisfactory, even in cases with considerable infiltration of the broad and utero-sacral ligaments, but without definite involvement of the pelvic wall. The report from Birmingham states that no case has been submitted to radium therapy which appeared amenable to treatment by surgical measures, and radium has not been employed as a preliminary to operative treatment, owing to the dense fibrosis in the surrounding tissues and the increased difficulties so produced in the performance of hysterectomy. On the other hand, the report from King's College Hospital is that the general experience there in inoperable cases has been that local conditions are much improved and operative procedure facilitated.

The Committee, in its general summing up, dwells on the importance of dosage, and states that the expression of dosage should go far beyond a mere statement of how much radium has been used and for how long. For some growths it may be useful to express the dose in terms of milligrams per cubic centimetre of tissue per day. "For example," the Committee says, "the introduction of 200 mg. of radium bromide into the cervical canal and embedding of 100 mg. in the tissues of the cervix for twenty-four hours, would, if we take the average volume so irradiated to be about 10 c.cm., amount to a dose of about 30 mg. per cubic centimetre per day. If we compare these doses with those often given in growths in other parts of the body, it is notable how heavy is the dosage generally employed for the uterus and how good are the results obtained." The Committee goes on to point out that the actual quantity of radium used is only one chief factor. It is not at present known whether, for a given new growth, it is better to use a large quantity of radium for a short time or a smaller quantity for a long time. The reactions in the normal tissues of animals under these alternative conditions are known to differ, but clinical knowledge must necessarily accumulate very slowly. The general impression conveyed is that, at any rate in cancer of the cervix of the uterus, the dose employed should be large rather than small.

One general conclusion that is considered to be justifiable is that some tumours are more sensitive to radiations than others, though it is not yet possible to place tumours in their order of sensitiveness, for even those of the same histological type are not all equally sensitive, and the sensitiveness of a given tumour may be affected to an unknown degree by the general or local reactions of the tissues of the host.

The paragraphs in the report dealing with cancer of the breast leave the matter in suspense, and the Committee recognizes that considerable latitude of view is natural. As to the best methods of dealing with the condition, apart from operation in early cases, Mr. Sampson Handley, reporting from the Middlesex Hospital, states that local excision was practised for a few of the superficial recurrences, but that most of them were treated by the insertion of radium tubes alone. This, in most cases, caused definite improvement, and sometimes the recurrent nodules disappeared. The resulting fibrosis, if the focus is near a large nerve, may occasionally cause troublesome neuralgia, or, more rarely, paresis of certain muscles. No vascular troubles, however, were traced to the radium; indeed, it usually diminished oedema of the arm if present. He is in favour of exposing the common sites for recurrence to tubes of radium at the time of performing the radical operation. At the same hospital Dr. Douglas Webster has been trying the effect of a proportionately bigger dose of radiation by placing the radium at a distance from the surface of the body, but the results are not yet ascertained. The encouraging feature of the data submitted is, the Committee says, "the endeavour which is being made to utilize radium fully as an aid to surgical measures in cancer of the breast."

[1] Medical Research Council, Special Report Series, No. 90. Medical Uses of Radium: Summary of Reports from Research Centres for 1923. H.M. Stationery Office, or through any bookseller. 1924. (Med. 8vo, pp. 34. Price 1s.)

The results obtained by the use of radium in malignant disease of the mouth, jaw, and throat are still disappointing, owing, as it is believed, to local anatomical and surgical difficulties rather than to any specific resistance by tumours in these parts of the body. Not only are the growths very often difficult of access, and in regions pervaded by blood vessels and nerves which must at all costs be preserved from overdosing, but the frequent presence of sepsis is a factor which largely militates against the success of the treatment.

From the sections of the report dealing with non-malignant conditions it is seen that the treatment of uterine haemorrhage continues to yield satisfactory results, whether the haemorrhage is due to fibroma or other causes. Considerable uniformity is observed in the dose employed, which is usually about 100 mg. of radium bromide. The well recognized place of radium in the treatment of rodent ulcer is confirmed, and the reports from the various centres contain records of a large number of cases successfully treated; further research, however, is necessary, for there is a certain diversity of opinion as to whether it is advantageous to use the more easily absorbed beta rays, or to use gamma rays exclusively.

Effective use has been made of the parcels of radium bromide set aside for experimental investigations. Though these are not designed for the exclusive purpose of relieving human suffering, they have been for the most part stimulated by the urgent need for more knowledge of the effects of radiation in general, and those from radium in particular, upon the living subject. Further valuable results are to be expected both from Cambridge and from the Radium Institute.

## CAPILLARY ENDOTHELIUM AND ANTIBODIES.

THE current notion as to the origin of antibodies is admittedly very vague, and of the nature of protective substances we are equally ignorant. They are to be recognized only by the effects they produce. Thus, we recognize a precipitin or an agglutinin because precipitation or agglutination occurs when these are brought in contact with appropriate antigen *in vitro*; an antitoxin because it neutralizes toxin; and so forth. We do not know where these things come from nor what they are.

Recently the attention of many immunologists has been turned to the capillary endothelium as a possible source whence antibodies spring. An impetus in this direction was provided by the researches on anaphylaxis, which raised a strong presumption that the endothelium is the site of that union between anaphylactic antibody and antigen which produces shock. Anaphylactic shock is essentially a cellular phenomenon, and the anaphylactic antibody is a precipitin. It is natural to ask whether the capillary endothelial cells may not also be concerned with other immunological processes not attended by shock.

Dr. Arthur Eastwood has contributed to a recent number of the *Journal of Hygiene* a comprehensive review of the question of the origin and nature of antibodies, with special reference to capillary endothelium as a possible source. We cannot condense Dr. Eastwood's scholarly survey of the intricacies of the subject into any brief statement: we recommend it, undiluted, to such as by their training or inclination have a taste for immunological dialectics. But many will be interested to hear of a hypothesis which Dr. Eastwood's meditations have led him to formulate. The endothelial lining of the capillaries forms a barrier which bacteria must penetrate before they can make their way either from the tissues into the circulation or in the reverse direction. We know also that filtration is a normal function of endothelium, which suggests that if the endothelium participates in the production of immune bodies its mechanism will probably have something to do with filtration. Moreover, certain facts can only be satisfactorily explained on the assumption that antibodies in the living body of the actively immunized animal are not necessarily identical with the antibodies in that animal's serum; the differences may be attributable to the transition from the unstable and more complex conditions of the living plasma to the relatively inert and stable conditions of the serum. These and other considerations have brought Dr. Eastwood to the following hypothesis: "When foreign protein is introduced parenterally, some of it is adsorbed by the surface of endothelial cells and thereby modifies the character of the endothelial filter. In consequence the fluids of the body which pass through this filter are also liable to modification. When the change in these fluids is found to be highly specific, it must be due to chemical as well as colloidal factors and must depend to a large degree on the precise stereo-chemical structure of the adsorbed antigen. The tissue fluids are highly unstable in their chemical structure; they form a loose union with the antigenic elements of the endothelial filter; this union is rapidly followed by dissociation, as the fluids pass through the filter; but it leaves in the filtrate a certain impression—namely, a chemical configuration which is adapted for union with free antigen under favourable colloidal conditions. In virtue of this change the circulating fluids have become antibodies."

As will be seen, the essence of this hypothesis is that the properties of the endothelial filter are changed by the adsorption of foreign protein, and that antibodies are formed by the modification of the fluids which pass through this altered filter. To account for the fact that antibodies may continue to be turned out at a later stage when the adsorbed foreign protein has disappeared a further hypothesis is necessary—namely, a persistence in the normal constituents of the endothelium of some "impression" which was formed in the earlier stages: the nature of the "impression" is assumed to be some alteration in normal metabolic processes, an alteration which may be passed on to new generations of cells. Dr. Eastwood would not wish us to accept this hypothesis as a definite theory; he does not claim for it finality, but offers it as a working hypothesis, provocative to thought and possibly stimulating to research. In this he is fully justified.

### EPSOM COLLEGE.

EPSOM COLLEGE, established in 1855 as a public school with a Royal Medical Foundation, combines with its educational work an extensive benevolent scheme. Fifty foundation scholars, the sons of necessitous medical men, receive free education, and fifty pensioners, either medical practitioners or their widows, receive £30 a year. Considerable financial assistance is also available for Epsomians in their subsequent medical studies in London hospitals. The cost of maintaining the Royal Medical Foundation is met by voluntary subscriptions and donations, and in this connexion we commend the letter of the chairman of the College Council, Dr. Raymond Crawfurd, which appears this week in our correspondence columns, to the careful

consideration of the medical profession. The high standard of the education at the College was manifest during the past year, when a "record" number of successes was obtained in university and other examinations. Epsom College is entitled to a greater measure of support than it has yet received from the medical profession generally; out of the 350 boys in the school, 76 per cent. are engaged in preliminary medical studies. Details of the Royal Medical Foundation and of the Epsom College war memorial will be found in our advertisement pages this week.

## THE LEAGUE OF NATIONS EPIDEMIOLOGICAL INTELLIGENCE.

THE Health Organization of the League of Nations has issued its statistics of notifiable diseases for 1923.[1] The statistics relate to 27 European countries, 15 African, 14 American, 12 Asiatic, and Australasia. Certain reservations are pointed out in the introduction. Wherever practicable the tables have been submitted to the responsible offices for their approval, but corrections have not been obtained from the more remote countries; also, efficiency of notification varies in different countries, and for this reason crude figures have been used more frequently than rates, as otherwise the reader might have been tempted to indulge in unjustifiable comparisons. Geographic distribution and seasonal variations have been shown as fully as possible. It is not professed that all diseases which could usefully be dealt with are yet included in the volume for 1923, but effort is being made to collect available data regarding venereal disease and certain other important causes of morbidity and death. If the data so obtained are found sufficient, a supplementary volume will be issued. Such a report as this cannot easily be made the subject of condensation or synopsis. The statistical material is a mine from which epidemiologists may dig masses of detailed information regarding the ebb and flow of infections throughout the world, and as years go on (this being the eighth of the series) the data will become more and more valuable. In the text introductory to the tables, however, the authors give a very brief indication of the position with regard to the various diseases. The plague-infected area remains unchanged, India having had, as usual, the vast majority of the cases. Although no very great extension has taken place, yet plague was more prevalent than in immediately preceding years. Cholera, on the other hand, shows a general and marked decrease, and the death rate in India was the lowest on record. Of yellow fever the outstanding feature was the entire absence of any reported case in Mexico, Central America, Ecuador, or Peru. Typhus incidence in Europe was generally (with exceptions) lower than in any year since the war, and a return to pre-war prevalence is evident; Russia shows a very marked decline. For small-pox the situation was favourable in Europe, notwithstanding local epidemics of mild type in England and Switzerland. In Russia there has been constant diminution since 1920, though even yet that country furnishes nearly five-sixths of all the European cases. The statistics of dysentery include a group of intestinal diseases of varied etiology, but amoebic dysentery is certainly uncommon in Europe. Notwithstanding some increase in Germany in 1923, the general trend is definitely downward in Central and Western Europe, and in Russia since 1922. Enteric fever (including paratyphoid) has been rather more prevalent in Western Europe and less prevalent in Central and Eastern Europe. Malaria was formidably prevalent in Russia, where there were over five and a half million cases, or more than double the previous year, whilst, on the contrary, there was a great reduction in Poland. Dengue fever rose to unprecedented prevalence in the southern parts of the United States in the autumn of 1922. Texas had between 500,000 and 600,000 cases, the maximum being in October, the disease then declining rapidly until it became rare in February, 1923. Influenza's morbidity statistics rarely represent the true incidence, because notification is not compulsory except in a very few countries. Mortality figures are more useful, and these indicate that the disease was much less severe in Europe in 1923 than in the previous winter. Encephalitis lethargica was more prevalent than in 1922, but less so than in 1921. The statistics of cerebro-spinal meningitis show no definite general tendency. Scarlet fever prevailed throughout Europe in 1920 and 1921, and declined in 1922 and 1923, though in the latter year it increased in Bulgaria and some other countries in Eastern and Southern Europe. Diphtheria shows a general decline in the last three or four years in various parts of the world—in Northern, Western, and Central Europe, North America, Japan, and Australia. Measles had a low incidence in many countries, but there were severe epidemics in the United States, Egypt, and Denmark. Whooping-cough is notifiable in few countries; its incidence was variable in 1923. Data for leprosy are defective. In 100,000 persons examined for trypanosomiasis in the Cameroons under the French mandate there were 30,000 cases. Statistics of trachoma are quite insufficient, but in countries like Egypt and Palestine 70 to 95 per cent. of the population are affected. Of anthrax there were in Russia 3,904 cases in 1922, and 7,801 in 1923. Under rabies it is stated that Germany had 74 cases, Czecho-Slovakia 22 (all fatal), and Latvia 21. Poland reported 2,572 cases of animal bites, of which 36 were fatal.

[1] London: Constable and Co., Ltd. (Roy. 4to, pp. 107; with maps. 2s.)

## NEAR SIGHT AND CIVILIZATION.

SIR ARTHUR KEITH, lecturing at King's College on December 11th to the British Optical Association, dealt with the causes of myopia. He argued that a myopic ancient hunter could not have survived, and deduced from this that in prehistoric times cases of pronounced myopia must have been unknown or very rare. Modern civilization had placed men's bodies under conditions altogether new to them. Hence thoughtful men were seeking to understand how our bodies reacted under the increasing artificiality of city life. To the question, "What is happening to our eyes which are now overtaxed by near work?" the answer returned by ophthalmic surgeons was to the effect that civilization is threatening our eyesight. They agreed that all children were born with eyes fashioned for "distant" sight—just like the young of wild animals. When, however, a thousand British children were traced from infancy to adult years, it was found by the end of the fourth year that some ten or more of them had lost the power of seeing distant objects clearly; every succeeding year others suffered the same loss; so that by the age of 20 about 150 of the 1,000 had become myopic. In inquiries into the nature of the disorders which overtake the bodies of men living under the conditions of modern civilization—disorders such as contractions of the palate and deformities of the jaws—he found that a study of the normal processes of growth threw most light on the manner of their production. He found no data to suggest that an eye which had remained normal until the twentieth year could thereafter undergo the changes which produced myopia. It might be concluded, therefore, that the causes which produced myopia were operative only in the growing eye, and that myopia should be ranked among the disorders of growth. Some said it was the strain which accompanied the convergence and accommodation due to using the eye for close work. This alone could not be the cause of myopia, for thousands of people strained their sight to the utmost with no ill effect on their power of vision. Some said it was muscular exercise, but this alone, whether mild or severe, could not be the cause of elongation of the eyeball, for then

all athletes and gymnasts would assuredly become myopic. The conclusion Sir Arthur Keith drew was that if the eye were healthy it would withstand unchanged all strains—great or small, continuous or interrupted—to which it might be subjected. His argument led him to suspect that the essential cause of myopia must be sought for in the behaviour of the fibroblasts, which were not only the bricklayers but also the architects of the edifice enclosing the structures of the eye. If the sclerotic fibroblasts laid sound material and laid it rightly, then all was well, whatever might be the use to which the eyes were put. But if the material was unsound and laid wrongly, then it was possible that forces which left the normal eye unaffected might damage the abnormal eye. It was on such grounds that ophthalmic surgeons instructed patients with high degrees of myopia to avoid eye-strain.

## LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

THE London School of Hygiene and Tropical Medicine has just made two interesting appointments. It has nominated Dr. H. H. Scott, at present assistant director in the department of helminthology in the tropical division of the school, to be Milner Research Fellow in comparative pathology. His appointment has been rendered possible by the co-operation of the Council of the Zoological Society. There is a fruitful field of research work in the Zoological Gardens for which Dr. Scott is well qualified; he is not only an experienced pathologist, who has done much original work in various fields, but is also well versed in helminthology and protozoology. He is M.D., M.R.C.P.London, and holds the D.P.H. and D.T.M. of Cambridge. The other appointment is of Dr. Edward Hindle, M.A., Ph.D., until recently professor of biology (including parasitology) in the Cairo school of medicine, to undertake research work in spirochaetosis. Investigations in this field are much needed, and Professor Hindle's record, both as a research worker and writer, is such as to suggest that he has exceptional qualifications for the work. The school has also determined to send out research workers to investigate diseases common to Rhodesia and tropical and subtropical Africa. This decision has been come to in response to a request from Sir Francis Newton, High Commissioner for Southern Rhodesia, made in accordance with a scheme originally suggested by Dr. Andrew Fleming, medical director for Southern Rhodesia. Dr. Fleming has recently been in this country to discuss details with the authorities of the London school, and the Government of Southern Rhodesia has undertaken to make a contribution to the school for the purposes of this research work, and also to provide laboratory accommodation and equipment. By its recognition of the immense importance of research into the causes of those tropical diseases which now bar the way to the full development of the highlands of central and equatorial Africa, the Government of Southern Rhodesia has set a very good example.

## THE MEDICO-LEGAL SOCIETY.

THE annual dinner of the Medico-Legal Society was held, under the presidency of Lord Justice Atkin, on December 12th. The customary toast, "Law and Medicine," was in the hands of Sir William Collins, who pointed out the various parallels between the two professions. In Germany the common territory between medicine and law was spoken of as State medicine, in France as "médecine légale," and in this country as medical jurisprudence, which was the title of the first work on the subject in English, by Samuel Farr, published in 1788. The subject was of wide range, from the exactitude of the chemist and microscopist on the one hand to the maze of psycho-analysis or of the criminal responsibility of the insane on the other. He alluded, but without very much hope of rapid materialization, to the proposal that an institute of forensic medicine should be founded in London, whereby the faculty would be concentrated in one centre instead of being divided among a dozen medical schools. Sir Humphry Rolleston, President of the Royal College of Physicians, responded to the toast on behalf of the medical side of what he called the holy alliance. Of the two divisions of the medical profession he could not help feeling that medicine or physick was more closely allied to law than was surgery. A very good definition of surgeons had been put forward by one of them—that the surgeon was a physician who could use his hands; to which, however, it might be retorted that the physician was a surgeon who could use his brain. But physicians and lawyers had this much in common, that both of them depended for their professional success upon their wits. The Medico-Legal Society, linking the two professions, offered to the medical members a means of culture, an expansion of outlook, and an opportunity to become wise in the many legal bearings of medicine. Mr. T. R. Hughes, K.C., President of the General Council of the Bar, responded on behalf of the legal profession. Mr. Justice Eve, in proposing the toast of prosperity to the Medico-Legal Society, said that no one who took even a cursory glance at the subjects with which the society had been dealing could fail to appreciate its value to both branches of its membership. He hoped that from its further discussions some clearer light would emerge on the criminal responsibility of the mental degenerate (for no one was satisfied with the present position), and on questions connected with workmen's compensation, such as industrial diseases, malingering, and partial as against total disablement. Lord Justice Atkin, in reply, said that there were very few persons now, in either the legal or the medical profession, who had not some idea of the operations and value of the society. The society, which had now passed its majority, and was increasing in its membership, acted as a liaison organization between the two professions, both of which were sincerely seeking after truth, although each approached the subject from different angles, and were it not for such a society would scarcely be able to reconcile their points of view. Two subjects on which the society had already done valuable work—namely, criminal responsibility and professional privilege—still awaited the last word to be said. A further advantage of the society was that each side learned to know some rudiments of the science of the other, not, indeed, to such an extent that lawyers could practise medicine or physicians practise law, but a lawyer at least found it greatly to his benefit to have some knowledge of medical problems. He referred to a course of elementary lectures on medical jurisprudence given recently by Sir Bernard Spilsbury under the auspices of the Council of Legal Education, and said that to a barrister engaged in criminal work to any considerable extent attendance at these lectures must have been worth another £500 a year! It had always been to him a marvel that so many laymen, whose business and private life was subject at all points to legal interference or direction, remained in ignorance of law, but he had to say also that a very large number of doctors, although they might be required to give evidence at any moment, went through their professional lives without any appreciation of the rules of evidence.

## CHARCOT CENTENARY.

PARIS is preparing to celebrate the centenary of Jean-Martin Charcot, who was born in 1825 and died in 1893. In 1862 he became physician to the Salpêtrière Hospital, where he gradually built up the world-famous neurological clinic. The centenary organizing committee, under the patronage of the President of the French Republic and the leading statesmen and scientists of France, includes as honorary presidents Professors Pierre Marie, Albert Pitres,

and Paul Richer, who were pupils and colleagues of Charcot. The president of the committee is Professor Babinski. Early in June commemoration ceremonies will be held in Paris by the Academy of Medicine, the Faculty of Medicine, and the Paris Society of Neurology. This society will hold at the same time its sixth international neurological reunion, celebrating the twenty-fifth anniversary of its foundation and the work of Charcot. Foreign Governments, universities, and scientific societies will be represented by delegates, and a large number of neurologists from many countries have signified their intention of joining in the celebrations. A detailed programme is being prepared, and may be obtained later from Dr. A. Souques, the general secretary of the organizing committee, 17, Rue de l'Université, Paris, VII^e^.

### A DEGREE IN ORTHOPAEDICS.

SOME years ago the University of Liverpool established the degree of Master of Orthopaedic Surgery. A candidate for the degree is examined in the principles and practice of orthopaedic surgery, and before presenting himself must have attended courses of instruction approved by the university, including a course of at least fifteen months in clinical orthopaedic surgery. Masters of Surgery of an approved university, and Fellows of the Royal College of Surgeons of England, Edinburgh, or Ireland, or of the American College of Surgeons, may be exempted from courses in anatomy and physiology and in pathology and bacteriology, but must attend courses in radiology and physiotherapy and in general surgery, as well as that in orthopaedic surgery. The degree has just been conferred for the first time. The recipient is Mr. E. B. M. Vance, M.S.Sydney (N.S.W.), who has resided in this country to go through the course of clinical orthopaedic surgery, which, as we have said, occupies fifteen months. So far as we can ascertain Mr. Vance is the first recipient of an orthopaedic degree, certainly in this country, and probably in the world.

### TEETH OF MAORI AND BRITISH IN NEW ZEALAND.

A COMPARATIVE study of the jaws and occlusions of a certain number of Maori and of British born in New Zealand was brought before the Society for the Study of Orthodontics at its December meeting by Miss V. H. George. In the course of her work for the Research Committee of the Dental Board at the Royal College of Surgeons, Miss George was asked to examine a number of plaster casts sent from New Zealand; these casts were obtained from twenty Maori and twenty men of British colonial stock on their return to the Dominion after the war and before demobilization. In all the Maori casts the palates were well formed, usually spreading in a wide arch containing the full number of teeth, and normal occlusion was apparently the rule. In the British casts, on the other hand, the arches were comparatively small and crowded, while the occlusion, which was usually subnormal, also afforded a notable contrast to the Maori series. She gave some average measurements based on these casts, showing the greatest width between the buccal surfaces of the canine teeth, the second premolars, and the molars; also the length of the palate obtained by taking a line drawn from the mid-point between the central incisors to the mid-point of a line connecting the last molars. They fully supported the statements quoted above. Miss George added that it appeared from descriptions by those who had studied the Maori at close quarters that their other physical characteristics were as markedly different from those of New Zealanders of the British race as were their jaws and occlusions. The New Zealand colonist had much the same physique as the average Englishman—medium height and build, with a rather long, narrow face, orthognathous profile, and brachycephalic skull. The Maori, according to Mr. Pember Reeves, a former Agent-General for New Zealand, are tall and bulky, long-bodied, short-legged, with a fairly large pyramidal skull, showing well developed perceptive faculties and features varying from classic to negroid, and a wide though not usually a flat nose. Some discussion followed on the diet of the Maori.

SIR DAVID PRAIN, C.M.G., C.I.E., F.R.S., M.B., Treasurer of the Royal Society, and late director of the Royal Botanic Gardens, Kew, has been elected a Trustee of the British Museum.

THE first social evening of the Royal Society of Medicine in 1925 will be held on Monday, January 19th, when Dr. Arnold Chaplin will give an address on some great personalities in history, good and bad, male and female. The address will be illustrated by portraits. During the evening Dr. T. M. Legge, C.B.E., will exhibit some fifteenth century stained glass.

## Medical Notes in Parliament.

[FROM OUR PARLIAMENTARY CORRESPONDENT.]

THE House of Commons completed the debate on the Address and advanced a number of bills before adjourning over Christmas. As Tuesday was occupied by a discussion on housing policy, which was initiated by the Labour party, no opportunity occurred for a general statement of the Government's policy on public health and medical administration, raised by Dr. Fremantle. The House is due to reassemble on February 10th.

During the debate on the Address (December 10th) Major Cohen, who was severely wounded during the war and spoke seated, said that medical practitioners in Swansea had been surprised at the number of men who came before them suffering either from wounds or disease directly traceable to the war but yet were not in receipt of pensions. An independent medical committee formed there concluded that there were certain disabilities with regard to which it was impossible for a medical man to say definitely that they would not alter. They specified organic diseases of the heart, chronic pulmonary diseases, rheumatism, gunshot wounds, and diseases of the joints. Major Cohen contended that it was not fair to fix a pension in such cases, and expressed the opinion that Circular 30 of May, 1924, was not satisfactory. All final decisions should be made by an independent tribunal. He pressed for a complete revision of final awards which were under 20 per cent. disability.

*Ex-Service Mental Cases.*—Major Tryon, the Minister of Pensions, in reply to Sir Herbert Nield on December 11th, deprecated the description of public asylums as pauper lunatic asylums; it was gravely misleading and needlessly offensive. Ex-service men who were, as certified patients under the general law of the land, in public asylums were there as private patients. The cost of their treatment averaged 25s. a week in addition to the allowances paid both to the men themselves and to their families. In 1923 the Government opened two special institutions for cases where they were medically advised that a chance of recovery or improvement was offered by occupational treatment and instruction. In these institutions 415 cases were now accommodated. All ex-service cases in public asylums were under periodical inspection by medical officers of the Ministry and of the Board of Control, and every case seeming suitable for treatment in some other class of institution was removed from the asylum. Relatives of some of the ex-service men preferred that the men should be in the county asylums.

*Private Mental Patients.*—The Minister of Health, in reply to Mr. Griffiths on December 15th, said it was the practice of the Board of Control to make inquiry regarding every individual private patient admitted to an institution without having been seen by a judicial authority. Mr. Griffiths said that the Board of Control had reported that during 1922 at least thirty-one patients were deprived of the right of appeal to a magistrate "through misdemeanour on the part of medical superintendents." Mr. Chamberlain replied that no instance had come to the notice of the Board during the year 1923 of failure to comply with the requirements of Section 8 of the Lunacy Act, 1890. Mr. Chamberlain further informed Mr. Griffiths that it was the practice of the Board of Control to return all reception documents which did not comply fully with the requirements of Section 31 of the Lunacy Act, 1890. This was done in order that the necessary information might be inserted.

*Indian Medical Services.*—Answering Dr. Fremantle and Mr. Wardlaw Milne, on December 15th, the Under Secretary for India, Earl Winterton, said that the Government had not reached a decision on the recommendations of the Lee Commission on the organization of the medical services in India. It was hoped to introduce a bill early in the present session (1924-25) dealing with the recommendations of the Lee Commission. In reply to Sir Philip Richardson, the Under Secretary for India said a report had been requested from India on the application of the recommendations made in 1918 by the British Station Hospital Committee, under the chairmanship of Major-General Sir George Makins. This report had not yet been received.

# Scotland.

### ABERDEEN MEDICO-CHIRURGICAL SOCIETY.

AT a meeting of the Aberdeen Medico-Chirurgical Society on December 4th, with the President, Dr. Peter Howie, in the chair, Mr. William Anderson gave an address on his experiences and impressions during a recent visit to America, describing particularly the surgical work of the large clinics and the teaching hospitals. He found the general principles of hospital administration much the same as those in this country, but there was usually a much larger surgical staff in proportion to the number of beds, and also a larger staff of nurses, male attendants, women clerks, stenographers, and photographers. Out-patient departments were run mainly on the same lines, but there was a much closer relationship between them and the wards. A useful adjunct was the diagnostic clinic, with beds for the admission of cases of undetermined diagnosis able to look after themselves, where investigation for diagnosis could be carried out before their admission to the wards; pressure on ward beds was thus to some extent relieved. Mr. Anderson then referred to the control of surgical ward work exercised by the American College of Surgeons. Hospitals were graded by the College according to their efficiency, and committee visits were paid annually to inspect all facilities. One very important feature of hospital work was the staff meetings; these were held at least once a month, and were always extremely private, so that free discussion took place on such subjects as the deaths in the hospital, the occurrence of sepsis in clean cases, and of post-operative pulmonary complications, the teaching of students, and subjects for special study. Record keeping, the follow-up system, and the social service were then described, and examples given of their methods and of their value to staff and to patients. Anaesthetics were given by trained nurse-anaesthetists, and Mr. Anderson had seen all methods in use except the administration of chloroform. Nitrous-oxide-oxygen was the most popular, but ethylene-oxygen was also being used extensively. He referred in some detail, and with great admiration, to the neurological surgery done by Cushing. Mr. Anderson then described in fuller detail the work of the Mayo Clinic and some of the special surgery done there—cardiac, gall bladder, and lung surgery, exsanguination-transfusion, and the investigations into liver function.

### PROPOSED SCOTTISH COLONY FOR MENTAL DEFECTIVES.

An address on the permanent care of the feeble-minded was delivered by Lady Leslie Mackenzie at a public meeting held on December 10th. Sir H. Arthur Rose, chairman of the General Board of Control for Scotland, presided over the meeting, which, he stated, was held in connexion with a resolution passed recently by the Edinburgh Women Citizens' Association, to assist in raising money for a scheme to found a colony for the permanent care of the feeble-minded. Lady Mackenzie stated that the subject of the permanent care of feeble-minded persons had been before some of her hearers for over twenty years. The people of Glasgow had taken up this subject long before Edinburgh did, and for many years in Glasgow there had been special schools for feeble-minded children. In recent years special schools for this purpose had been established in Edinburgh, and she wished to make it clear that the mentally defective child was simply a child whose brain was not fully developed, and which, unfortunately, would never be fully developed. It was important, therefore, to train that brain, although they could not cure it of its deficiency. In the special schools, whatever way the teacher found to be best for using the intelligence of the child was adopted, and the teacher was given a wide amount of liberty in this respect. Such things as gardening, keeping pets, manual work, and doing odd jobs about the school were given to the children to do. In Glasgow there were over 2,200 mentally defective children in the special schools, and in Edinburgh there were between 400 and 500. Although children were well looked after during the time they spent in these schools, they had to leave at the age of 16, being still at that age little children so far as their mental equipment was concerned, and, therefore, unable to earn their living and to compete with the ordinary intelligent human being. There was thus, unfortunately, a great tendency for many of the boys to get into trouble, to be convicted for stealing, and to pass from prison to street, from street to poorhouse, and so on. The girls very often became the mothers of illegitimate children, and it was particularly important to prevent motherhood in these girls, and so to stop the reproduction of feeble-minded people to a certain extent. It was to meet the needs of the hundreds of children leaving the special schools at the age of 16 that the women citizens had come to the conclusion that they should take action. The action they proposed to take was to collect sufficient funds to start one institution for the permanent care of the feeble-minded, and it was proposed that this institution should take the form of a colony where the inmates could begin with school and then later go to workshop or farm, or some other form of occupation still within the colony.

### CENTRAL MIDWIVES BOARD FOR SCOTLAND.

The report of the Central Midwives Board for Scotland for the year ending March 31st, 1924, has been issued. At the annual statutory meeting Dr. James Haig Ferguson was re-elected chairman, and Dr. Michael Dewar deputy chairman. The total enrolments of midwives for the year had been 458, which, with 5,477 previous enrolments, completed a list on the register of 5,935. Of this number 2,584 had been admitted after examination, and it was believed that the number actually in practice was at the present time approximately 3,000. Four examinations were held annually, taking place simultaneously at examination centres in Edinburgh, Glasgow, Dundee, and Aberdeen, subject to a sufficient number of candidates having entered at each centre. The number of candidates who appeared for examination during the year was 473, of whom 430 had passed. These came from fifteen different institutions in Scotland at which midwives may be trained, and of which four were Poor Law institutions. During the period under review sixteen midwives were cited to appear before the Board to answer charges of malpractice, negligence, and misconduct, and as the result of these charges the names of ten had been removed from the roll. In seven cases the offence charged was that of failure to send for medical assistance in cases of inflammation of the eyes, excessive bleeding, abortion, rupture of the perineum, and failure to notify these cases. Five women were suspended from practice for three months for general carelessness in treatment, failure to attend during the full period of puerperium, or failure to keep records of pulse and temperature. The Board had resolved that after January 1st, 1926, the period of training should be increased to twelve months, except in the case of nurses already enrolled in the registers of the General Nursing Councils of Scotland, England, and Ireland as having completed a training in general nursing, nursing of sick children, or nursing of infectious diseases. In these cases the period of midwifery training would be limited to six months.

# England and Wales.

### UNIVERSITY OF LEEDS CELEBRATION WEEK.

IN 1874 the Yorkshire College of Science opened its doors with three professors and twenty-four students; in 1877 a faculty of arts was founded and incorporated in the college in the following year. In 1904 the college received its charter as the University of Leeds, Sir Nathan Bodington becoming its first vice-chancellor. Of the four faculties of the present university—arts, science, technology, and medicine—the first is the largest; yet medicine preceded the university and the Yorkshire College of Science by a very considerable period chronologically, for in 1831 the earlier efforts to provide systematic medical training in Leeds reached their fitting conclusion in the establishment of the Leeds School of Medicine, which became part of the Yorkshire College in 1884. The teaching staff of the university includes 268 men and women; there are forty-two departments of study and more than 1,600 day students. The

jubilee celebrations during the current week commenced with a sermon by the Archbishop of York on December 14th, when he expressed the hope that some day a faculty of theology might be added. In the afternoon of December 15th Sir Berkeley Moynihan gave a most interesting account of the progress of medicine in Leeds.

### SHEFFIELD JOINT HOSPITALS COUNCIL.

The second annual report of the Sheffield Joint Hospitals Council, which has just reached us, gives an account of the very satisfactory progress made during 1923 in hospital finance. In particular the "penny in the pound" scheme, of which we gave a detailed account on September 15th, 1923 (p. 483), has received considerably increased support, many of the smaller establishments throughout the area having co-operated for the first time. This scheme brought in £10,866, as compared with £3,957 in 1922. The income of the council showed a surprising increase over the preceding year, and amounted to over £102,000; it was £72,000 in 1922. This most satisfactory increase occurred despite the severe unemployment and depression in trade which characterized the year generally. The report draws attention to the marked loyalty of every section of the city to the voluntary hospitals, and the happy co-operation that exists between the Joint Hospitals Council, the hospital boards of management, and the various individuals and institutions concerned. The total number of available beds in the Sheffield hospitals is stated to be 856, and there are said to be 2,759 patients waiting for admission. The Lord Mayor of Sheffield in the report urges, therefore, that further efforts should be made to meet the growing necessities of the city in this respect. The in-patients during 1923 numbered 12,697, and of these 3,586 were unemployed and necessitous. The total number of out-patient attendances was 386,552. During the year under review 495 patients were sent to convalescent and rest homes at a total cost of £2,864, paid by the Joint Hospitals Council. The great variety and value of the work undertaken by the council is brought out clearly in the annual report, which will attract especial interest, since in some ways the methods adopted in Sheffield differ from those in favour elsewhere.

### MANCHESTER CHILDREN'S HOSPITAL.

The Earl of Derby formally opened on December 8th a new home for nurses in connexion with the Royal Manchester Children's Hospital in Pendlebury. Accommodation is provided for sixty nurses in a spacious and well furnished recreation room, but at present only twenty-nine bedrooms are available. Provision has been made by the architect for the opening of another wing in a few years, if the necessary money can be collected. This would render it possible to house all the nurses, apart from those actually living in the hospital itself. Up to the present an isolation block has been used as a nurses' home, but the new building will now enable this block to be available for its original purpose in case of emergency. Of the £17,000 required for the new building £10,000 has already been received. Lord Derby paid a warm tribute to the valuable and unselfish services rendered by the nursing staff, and referred to the important work carried on in the hospital. Since the ground on which the home is built overlies a coal mine, the whole site has been covered with strong reinforced concrete, to minimize so far as possible any danger of subsidence.

### EXPENDITURE ON TUBERCULOSIS AND OTHER SERVICES IN LONDON.

The Ministry of Health has asked the London County Council to forecast its expenditure for the year 1925-26 on the treatment of tuberculosis, the diagnosis and treatment of venereal diseases, and maternity and child welfare services. The forecast as regards tuberculosis is £135,650, which is £15,000 more than the estimate for the present year. For venereal diseases the Council's proportion of the estimated expenditure to be apportioned between the Council and neighbouring local authorities is £91,565, which compares with almost the same amount for the present year. Both these figures are exclusive of sums of £20,000 and £10,000 which it is proposed to include in provisional amounts to cover possible developments of the work in connexion with the services mentioned. The net expenditure on maternity and child welfare services is estimated at £10,190, as compared with £9,664 for the current year.

# Correspondence.

## EPSOM COLLEGE.

SIR,—With the approach of Christmas, a season in which humanity at large relaxes its purse-strings, I ask your readers to bear patiently with me while I expound to them the work and the needs of one of the great medical charities.

The Royal Medical Foundation of Epsom College exists (*a*) to give pensions to fifty aged or disabled medical men or their widows, and (*b*) to provide, free of charge, a good public school education, together with clothing, maintenance and pocket money, to fifty sons of deceased or disabled medical men.

The Medical Foundation, so far as it is educational, is part and parcel of Epsom College, which is a public school open to all, but aiming especially, according to the intentions of its founder, at affording to the sons of medical men generally a school education at as near cost price as possible.

Generous benefactions have augmented the value of many pensions and increased their number, so that last year the College bestowed no less than 166. That alone alleviates a sensible part of the destitution that befalls the unlucky in our profession as in any other. But the part relieved is not nearly large enough, and to do much more much more money is needed.

Perhaps, however, it is our educational work that awakens the warmest and widest sympathy. There is very keen and widespread competition for the Foundation Scholarships, which have given to so many needy boys a start in life, open to them in no other way. The expenditure on these has been greatly increased owing to the circumstances of the war and growing educational needs.

To those who may catch sight of this letter I appeal to set it aside for perusal after a satisfying Christmas dinner; to sit down then in an easy chair with a pipe, and with closed eyes to conjure up before their minds a vision of their own wives, left widows in need, and suppliants to human kindness for the upbringing and perhaps the very bread of their own necessitous children. Then let them at once, before the image has dissolved in the welter of work, draw up to their table and write us a cheque for such a sum as the spirit has moved them to give. I warrant that the whole seance shall add to, not detract from, the gladness of their Christmas festivities.

Commercial travellers, haberdashers, and others provide tens and hundreds of thousands of pounds yearly for their needy; medical men give us less than four thousand for theirs. At present one medical practitioner in sixteen helps us; if all would help with half a guinea yearly, or, better still, because easier of fulfilment, if half would help with one guinea yearly, we could multiply our present income by six. In five years the Medical Foundation, at its present dimensions, would be permanently endowed, and all wearisome begging would be at an end, to the great advantage of the College. With like support for a further five years we could go forward confidently to make our benevolent work commensurate with the full needs of the profession, and our school, with due regard to the intentions of our founder, second to none and an example to all, and an object of justifiable pride to the whole profession. So trifling an individual sacrifice for so immense a common good cries aloud for its accomplishment!

Let me first lay my own gift on that altar by trebling my own subscription, so that I may earn the right to appeal to those who already help us and can do more to do it, and to those who do not help as yet to come to our aid.

*Cras amet qui nunquam amavit, quique amavit cras amet.*

One guinea annually, or a single donation of ten guineas, makes a governor and gives ten votes at each election in June of foundationers and pensioners, and each additional guinea annually gives ten votes more. Voting papers, with details of candidates, are sent in advance to every governor. Seldom a list that makes no direct appeal: sometimes it will be the voice of a dead friend asking help for those he has left behind.

Please send a subscription or donation to the Secretary of Epsom College, 49, Bedford Square, London, W.C.1, who will be glad to give any information, and welcomes personal visits at any time.—I am, etc.,

RAYMOND CRAWFURD, M.D.,
Chairman of the Council of Epsom College.

49, Bedford Square, W.C.1, Dec. 3rd.

## FREUDIAN DOCTRINE.

SIR,—I have read with much interest the article in the JOURNAL of December 6th (p. 1063), which is headed "An attack on Freudian doctrine," and includes a summary, by Professor Sollier, of the proceedings at a conference on psychology held at the Institut des Hautes Études de Belgique, which was published in *Le Scalpel* of October 4th and October 11th this year.

In the course of this conference the discussion of psycho-analysis played, as the title of the article in the JOURNAL implies, a very important part. So far as I know no discussion of this subject of similar weight and authority has taken place under the auspices of any medical or scientific body in Great Britain. Yet the principles and practice of psycho-analysis are becoming widely known among the laity, and are constantly being referred to by the public press and in the pullulating literature of fiction as "the new psychology." They have also been received in the form of speeches or papers by a conference of Modern Churchmen and at a meeting of the Royal Anthropological Institute, without discussion, in the course of this year.

I do not ask you, Sir, to open your pages to any such discussion as I have in mind, but would merely suggest that you might be able to invite members of the medical profession, as well as psychologists generally, to say whether or no such discussion would be desirable and practicable. I may add that two considerable attacks on Freudian doctrine have been published during the last two years in London, neither of which has been replied to by any prominent advocate of this doctrine.—I am, etc.,

BRYAN DONKIN.

London, W.2, Dec. 12th.

*** We are prepared to receive replies to the suggestion contained in the last paragraph of Sir Bryan Donkin's letter, but cannot open our columns to the discussion of Freudian doctrines generally.

## THE GENERAL PRACTITIONER AND THE MATERNITY SERVICE.

SIR,—Let us hope the reasoned appeal of Dr. John S. Fairbairn, whose opinion is of great value, that this controversy may not develop into something like a wrangle between the general practitioners and the obstetric experts, may bear fruit. But I have certain doubts; the attacks of his specialist friends have been too bitter and provocative, I am afraid, for anything like a truce.

Dr. Fairbairn's call upon the practitioners to withhold the scourge from the shrinking hides of the specialists is grimly amusing. The present correspondence was initiated by Dr. A. Louise McIlroy, who made certain statements and laid down certain suggestions. This was followed by a letter from Dr. Agnes Hill Nicoll, who supported and elaborated Dr. Louise McIlroy's communication. It is fair to assume that neither of these writers has much experience of general practice, at any rate in wide country districts. They barely disguised their contempt for the general practitioner as an accoucheur; but they went out of their way to "boost" thoroughly "the highly skilled body of specialists" disguised as midwives, and implied, not obliquely, that unskilled midwifery was directly due to the ignorance or incompetence of certain wretched practitioners. Listen to Dr. Agnes Nicoll in your issue of October 11th: "I would add my testimony as to the results of unskilled midwifery in producing the chronic ill health of many mothers who attend child welfare clinics." It is presumed, naturally, that general practitioners are chiefly, if not solely, responsible for the prevalence of puerperal sepsis.

One hesitates to retort upon these ladies, especially as I am of opinion that their knowledge of general practice is rather limited. It is one of the inevitable consequences of the admission of women into the medical profession, who are excellent students and usually glib in examinations, that they find themselves rather in the air when they undertake general practice, and so they incline to some sort of officialism and favour jobs under an authority. Of course, I am not out to attack medical women, and least of all two such distinguished women, though I am inclined to view their faith in specialization and institutional treatment, and all the other potential aids of licensed officialism, as a remedy for the present alleged parlous condition of obstetrics, as being rather pathetic. But I do protest against the constant iteration of specialists, individually and collectively, that puerperal sepsis usually arises in general practice and should be laid at the doors of the family doctors. There is not the slightest evidence for such a misconception that I am aware of.

The question now arises, Why is there so much puerperal septicaemia in these days of improved technique and general and special knowledge? In my opinion the reply is not only simple but quite obvious. Ever since the increased employment of midwives the progress of midwifery in general practice has halted and gradually diminished. Owing to many causes maternity work has become unpopular in general practice. It is uncertain; the work is also sometimes extremely irksome and irregular; it often involves night work, and sometimes demands great skill and pluck and initiative at the very time when one's vital energy is at the lowest ebb; and it is also quite unremunerative in proportion to the time and skill employed. Beyond that there is another factor in the disinclination for obstetrics which Dr. Louise McIlroy artlessly mentions—namely, the lamentable deficiency of the clinical training of medical undergraduates. It is not only lamentable: it is nothing short of a national scandal! Dr. Fairbairn may endeavour to defend his own class in your columns, but it is notorious that in the universities and medical schools the amount of time and attention given to practical midwifery is grossly insufficient. I have employed assistants and locumtenents recently qualified, whose knowledge of the art and practice of midwifery was almost elementary.

In the old days a man went into general practice, often as an assistant, with an experienced general practitioner who did all his own midwifery. After an uncertain period of what was really advanced apprenticeship he was bound to learn a good deal about normal and abnormal labour. There was a period of some mental distress and many alarms and quakings, and he either emerged a sound obstetrician or else for ever after dreaded the very name of obstetrics. Nowadays a medical practitioner may have a large and valuable practice and scarcely ever be called upon to attend a confinement. Normal cases are taken off his hands by the midwives, who call in an expert when in difficulties, and his better-class patients seek sanctuary in a nursing home or some other obstetric institution. Should he ever essay a maternity case he finds himself sadly lacking in that experience and knowledge that can only come from constant practice. The consequence is that the modern family doctor is less able to undertake obstetrics than his predecessor, and the general level of obstetric achievement is lowered.

That such a condition of affairs is other than good for the profession and the public is pretty evident.

And what is the remedy? First of all, give the future medical practitioner a sound grounding in practical midwifery. It is nonsense to say there is no time or opportunity for this: before now I have taught a raw assistant how to deal with practically every complication he is likely to see in general practice in a very short time. Obstetric experts and specialists are too prone to magnify their art and the difficulties of complicated cases. My old chief, who thoroughly knew his business, used to say that there was less skill required than in cleaning a clock or tying a trout fly. Given a sound technique and a fair training with plenty of practice, all the difficulties mentioned in such a textbook as Fairbairn's *Encyclopaedia of Midwifery and Diseases of Women* speedily vanish, and the practitioner can confidently undertake almost every case he is ever likely to come across.

I consider the modern tendency to banish midwifery from general practice, and so to create a monopoly shared between the midwives and the specialists, a most pernicious one—and I speak after an experience of some four thousand cases

which embraced practically every kind of difficulty, from simple forceps extraction to Caesarean section. I never see puerperal sepsis, and I have not yet had occasion to call in another medical man—except in rare cases to give an anaesthetic. I hold that the home is the most natural place for the confinement, and that the family doctor is the best accoucheur in the great majority of cases. True, there may be exceptions in large industrial areas or where the house is unduly insanitary. But should obstetric institutions come into vogue universally I can see no reason why the general practitioner should not conduct his own cases. There may be some individuals who feel inclined to delegate this duty to others, for reasons of convenience or want of confidence. Such an attitude is bad for doctor and patient. The craze for team work and specialization in every department of medicine is working havoc with the general level of the practitioner's work. He is fast becoming a sort of glorified drudge, whose activities are confined to first-aid and signing certificates for an exacting authority. The openly expressed contempt of the one-sided experts will very soon extend to the general public, if it has not already done so. It is up to the general practitioners to speak for themselves and to stay any further excursions into their domain.

I have an opinion, founded upon fair knowledge, that the statistics of a well conducted general practice compare more than favourably with those of even the best institutions. Not long ago a midwifery case, previously successfully delivered at home by the family doctor, was removed into an institution at the end of the eighth month of pregnancy on account of a justo-minor pelvis. She died on the third day of the puerperium! Personally, I should prefer the services of a first-class general practitioner to any specialist I have yet seen at work, provided the case was one which did not require much cutting. There should be no rivalry between specialist and practitioner: certain surgical and obstetrical cases are of such a nature as to demand the highest skill of the expert in a suitable institution. In midwifery practice such cases are extremely rare, and when they do occur the well trained and experienced practitioner is infinitely better able to deal with them than any midwife.

One cause of infection in women of the industrial class treated at home I have not seen mentioned, and that is a want of personal cleanliness of the pregnant woman. I had to fight a battle royal, I remember, when I first insisted that every woman must have a warm bath with plenty of antiseptic soap at the beginning of labour. The effect of such an elementary precaution was really marvellous. Rises of temperature that were too frequent practically disappeared. I am of the profound opinion that the great majority of infected cases are due to preventable causes. They arise from infection due to a lapse on the part of either the midwife, the doctor, or the woman herself.—I am, etc.,

Helmsley, Yorkshire, Dec. 8th. ALEXANDER BLAIR, M.D.

## PUERPERAL SEPSIS.

SIR,—I consider that Dr. Stavely Dick has struck the keynote (December 6th, p. 1079) in respect of the diagnosis, prognosis, and treatment of fever associated with the puerperium.

I may add that if the blood, the urine, and swab are found to be sterile a dose of calomel will quickly clear up matters, as in this case the temperature, etc., are most probably due to an intestinal toxaemia. If, however, organisms are found, the importance of an early diagnosis cannot be overmuch stressed.

I should place the treatment and early diagnosis of puerperal fever on the same footing as that of pneumonia. To wait for the classical signs is simply courting disaster. In the latter disease early diagnosis, including that of the organism, is all-important.

Shortly, my method of procedure is as follows: An early sputum examination and the immediate injection of a stock vaccine of the like organism whilst an autogenous is being prepared. As long as there are signs of improvement I never repeat the vaccine. Too early repetition is, in my opinion, the great mistake in vaccine therapy. I keep my patient on water for at least forty-eight hours, allowing only fruit juices and an occasional stimulant if necessary. My experience in pneumococcal pneumonia is that one may confidently expect a crisis in from twelve to thirty-six hours if the above precautions have been taken.

It would be of great interest to know if any of your readers have had experience of immuno-transfusion in either of the above diseases. In a case of ulcerated colitis in which I had an immuno-transfusion performed my patient died within an hour with all the symptoms of an anaphylactic shock. This case, however, was already of three months' duration.—I am, etc.,

Plymouth, Dec. 14th. W. LANG-HODGE.

SIR,—In your issue of December 6th (p. 1079) Dr. Stavely Dick relates some of his experience in dealing with this disease. I feel that Dr. Dick, and perhaps others among your readers, may be interested in the following results of fifteen cases which were investigated in the laboratory of the Women's Hospital, Birmingham. In each of this series the presence of a septicaemia was proved by obtaining from the blood stream a pure culture of a haemolytic streptococcus.

Four of these cases recovered, all of which were treated with an autogenous vaccine. Of the fatal cases—eleven in number—three only received autogenous vaccine, and all three were admitted to hospital after more than a week's illness with pyrexia. In seven out of eight of the remaining cases, death occurred within forty-eight hours of admission, and thus administration of an autogenous vaccine was precluded. In one fatal case a vaccine was prepared but was not administered, and at autopsy a recent vegetative mitral endocarditis was demonstrated, engrafted upon an older inflammatory lesion of this valve.—I am, etc.,

Edgbaston, Birmingham, Dec. 8th. REGINALD G. ABRAHAMS.

## TONSILLECTOMY.

SIR,—I have read the correspondence under the above heading with some interest. That enucleation of the tonsil, when necessary, is to be preferred to tonsillotomy must be the opinion of a large majority of laryngologists; but if it is to be maintained by those who habitually practise dissection that no other method is surgical or thorough, then I must declare myself to be among those who disagree. I do a large number of these operations in the course of the year, and I do not suppose that more than 2 per cent. are cases for dissection. The important point that must not be lost sight of by the operator is that primary and secondary haemorrhage is invariably due to the fact that a portion of the tonsil has been left behind. This is the underlying danger of tonsillotomy.—I am, etc.,

Maidstone, Dec. 8th. J. A. GIBB.

SIR,—I am surprised to see surgeons still discussing the comparative value of tonsillotomy and tonsillectomy. And I am so convinced of the superiority of the Beck-Sluder hidden-wire instrument that I feel impelled to bring it again to the notice of British surgeons. It meets all the requirements demanded by Dr. Sichel (BRITISH MEDICAL JOURNAL, November 15th, p. 926), provided one understands that the tonsil must be pushed by the forefinger into the foramen. A little knack is needed, and the tonsillectomy is beautifully clean and free from injury to surrounding tissues. The only cases in which it fails are those in which the tonsils and fauces are firmly matted by old adhesions.—I am, etc.,

Atlanta, Georgia, Nov. 29th. ALEX. W. STIRLING, M.D.Edin.

## SAUCE FOR GOSLINGS.

SIR,—Surely it is getting high time for the collective opinion of the profession to express itself with some approach to definiteness on the question of medical publicity. The proceedings of the General Medical Council and its judgements expose us, not altogether unnaturally, to a good deal of lay ridicule, not untinged with contempt. Yet we are not in a position to blame the Council, seeing that we, like it, have so far formulated no accepted principles for our own and its guidance.

Small men are haled before the Council, and either patronizingly censured or removed from the ranks of the profession for two-guinea contributions to the weekly press, whilst the hundred-guinea contributions of their big brothers to the daily press are tolerated without comment. I could quote examples by the dozen. Only to-day I picked up in a bookshop a new popular work, with the not too dignified title, *How is Your Heart?* clothed in a "jacket" as sensational as the title. The name and qualifications of the author are blazoned on the cover, the title-page, and the wrapper. And the book is prefaced by an introduction from the hand of one of our medical baronets, in which he informs the public that Dr. —— (the author) "has made a special study of the particular subject under consideration"; that his "experience in the study of heart affections is very large"; that he is "thoroughly versed in his subject, and familiar with all its principles"; and that he possesses "a wisdom that is all too rare." It will be indeed surprising if many dozens of readers, when they come to chapter ten, which deals with "Early heart-signs that should take you to your doctor," do not straight away look up in their telephone directory or other work of reference the address of this wise and experienced man.

I happen to take the rather priggish view that the interests of the public must override our professional interests when they conflict. And therefore I am not quoting these extracts for the purpose of hostile criticism; but I am perfectly sure that if any of us lesser fry were to write for the lay press an article on any special branch of medical practice, and allow it to be prefaced, either editorially or by a medical friend, with boosting announcements of our prowess and experience in this particular branch, we should soon find ourselves in the medical dock. Sauce for the gosling should be sauce for the gander. Whatever laws we lay down should be such as can be defined and expressed in words. Having been laid down, the observance of these laws should be imposed with genuine impartiality on royal physicians and the humblest medical journeymen alike.—I am, etc.,

London, E.1, Dec. 8th. HARRY ROBERTS.

## THE MADRAS GOVERNMENT AND INDIGENOUS SYSTEMS OF MEDICINE.

SIR,—In my letter published in your issue dated October 25th I wrote: "The recommendations for the cutting down of the diets have been made on the advice of an inspecting officer, who, whatever his admirable qualities may possibly be, has, I believe, no qualification that would entitle him to registration in Great Britain." A Madras correspondent has kindly written to point out to me that the L.M.S. qualification of Madras University, held by this gentleman, was *formerly* registrable. I at once communicated with the Registrar, General Council of Medical Education and Registration of the United Kingdom, who has kindly given me the following information:

"The L.M.S.Madras ceased to be registrable on May 24th, 1893, when the Council drew the attention of the University to their resolution that the course of study should occupy at least five years, and stated that in these circumstances they could not accept the Licence with its then curriculum of four years, except in the case of those who commenced study before January 1st, 1892. Further requests for its recognition were made in 1915 and 1917 and were both refused."

I have also ascertained from the same source that as this gentleman qualified in 1890 he was actually eligible for registration, but that "he has never appeared upon the *Medical Register* here." I regret that even in so small a detail I should have been incorrect, and, though the error does not in the least affect my point, I desire to do away with any shadow of want of accuracy. May I therefore ask the favour of your inserting this letter in the JOURNAL?—I am, etc.,

London, W., Dec. 12th. R. H. ELLIOT, Lieut.-Colonel I.M.S.(ret.).

## MULE-SPINNERS' CANCER.

SIR,—It would be unfortunate if anything I said, or omitted to say, in my paper conveyed a wrong impression regarding Mr. S. R. Wilson's observations. I accept unreservedly his statement that he was aware of the association of scrotal cancer with mule-spinners as far back as 1906, and that he convinced his colleagues in Manchester of the truth of his thesis, although Mr. Morley in 1911, in the paper to which he refers, did not mention this striking association. In view of the high incidence of the disease we can join with Mr. Wilson in his regrets that circumstances prevented the publication of his findings for so many years, during which, had the knowledge been more widely disseminated, steps might have been taken to prevent its occurrence. As nothing appeared in print before November, 1919, or was known even to the factory inspectors, I think I was fairly accurate in stating that "no one until within the last two years *seemed* to have known . . ."

Please give me leave once again to express my great appreciation of the value of the discovery of mule-spinners' cancer by Mr. Wilson and his colleague Mr. Southam, and to say that if by further endeavours they are instrumental in preventing it, as they quite well may do, they will have done a good service to medicine.—I am, etc.,

Cancer Hospital Research Institute, London, S.W.3, Dec. 13th. ARCHIBALD LEITCH.

## DIAGNOSIS OF CANCER OF THE THYROID.

SIR,—May I correct a statement attributed to me in the JOURNAL of December 13th (p. 1113) in the report of the discussion on "Diagnosis of cancer of the thyroid"?

The final sentence reads, "He made a strong plea for the removal of all adenomata of the thyroid, since eventually they caused pressure or toxic symptoms or became malignant." This report contains two grave errors, as neither the statement nor the reason given for it is correct.

To remove all adenomata would be unnecessary for the patient and discreditable to the surgeon. What I said was that because some adenomata ultimately cause pressure symptoms, because some eventually become toxic, and because 3 per cent. of the cases which had come to operation—not 3 per cent. of the cases seen—had been proved to be malignant, therefore adenomata of the thyroid could not be regarded as entirely innocuous tumours; also that a woman has the right to ask for the removal of a tumour which is large enough to be a disfigurement, when the enucleation of an adenoma does not deprive her of any normal thyroid tissue.—I am, etc.,

London, W.1, Dec. 15th. T. P. DUNHILL.

# Medico-Legal.

## VERDICT OF MANSLAUGHTER AGAINST A MEDICAL MAN.

*Rex v. Bateman.*

AT the Central Criminal Court, on December 12th, Dr. Percy Bateman, a medical practitioner, of New Cross Road, was found guilty of the manslaughter of the wife of a labourer named Harding, living at Deptford, and Mr. Justice Shearman sentenced him to six months' imprisonment in the second division.

Mr. Percival Clarke, Mr. H. D. Roome, and Mr. W. Bentley Purchase prosecuted for the Director of Public Prosecutions, and Sir E. Marshall-Hall, K.C., and Mr. Arthur H. Davis appeared for the defence.

It appeared that the accused was called in to attend Mrs. Harding in her confinement at 10 p.m. on July 23rd last, and the prosecution alleged that her death was caused or accelerated by his failure—in the circumstances which arose during the confinement—to call in a second medical practitioner and to arrange for an immediate operation. His omission to take these steps was, it was contended, due to his desire to prevent anyone from knowing that he had pulled away the uterus during the confinement. The accused continued to attend Mrs. Harding at her home until July 28th, when he sent her to hospital, and she died at the hospital on July 30th.

Sir Bernard Spilsbury, in the course of his evidence for the prosecution, expressed the opinion that if the woman had been operated upon she would have had some chance of surviving, and that she would have been fit for an operation before she was removed to the hospital.

Dr. J. Bright Banister, obstetric physician to Charing Cross Hospital, giving evidence for the defence, said he only knew of two other cases where the uterus had been removed, and in both of them no operation was performed—in the one case because the patient died on reaching the hospital, and in the other case because the patient died within thirty minutes of arrival at the hospital. Therefore, in his opinion, the conduct of the accused in keeping the patient lying at her house for five days without sending her to hospital for an operation could not be said to have accelerated her death. Her chance of life was so small as almost to be negligible. He (the witness) would have forbidden the

patient's removal to hospital, and, in his opinion, removal would have destroyed any chance of life. Some time during the five days following the confinement there was just a chance that she could have been removed and have had a successful operation. He could not say there was any more favourable moment at which she could have been removed than the moment at which she had been removed. The doctor in attendance must always be the judge. Her chances of life were as good left where she was as if she had been operated upon. If it were a complex presentation, as the accused said it was, then it was a most difficult affair.

Dr. Hubert Roberts, senior obstetric surgeon to Queen Charlotte's Hospital, also gave evidence for the defence. He said it was a very difficult and dangerous case, and as the patient was suffering from acute shock nothing more could be done beyond leaving her at rest in bed. In cross-examination, he agreed that it would have been advisable for Dr. Bateman to have called a colleague into consultation.

Dr. Bateman, in his evidence, said that when he was called in the nurse who was in attendance said the deceased woman had had pains for two days before. He made an examination with his hand and he felt the head of the child. He gave chloroform to the patient and applied instruments, but they slipped at once as it was a transverse presentation. He immediately desisted from the use of instruments and decided to use a treatment known as manual version. He realized that it was a difficult case, but if he sent the woman to an institution then the probabilities were that the child would be born dead. He therefore put his hand in the vagina to ascertain the position, and he found the feet. When turning the body of the child there was considerable difficulty because its head was in the pelvic cavity, firmly impacted. He continued the treatment for over an hour, and finally succeeded in delivering the child feet first in the usual way. He then attended to the patient again for the purpose of bringing away the afterbirth. He put his hand into the womb and brought the afterbirth away quite easily without the use of any force at all. The nurse was standing by with a bowl, and he put the afterbirth in the bowl without looking at it very carefully, as the patient had collapsed, and it was necessary for him to attend to her immediately. The room was very badly lit at the time by one broken incandescent gas mantle, five or six feet from the patient, and it would not have been possible to make an examination of the afterbirth without looking at it very closely and carefully, which he had not time to do. He felt the woman's pulse and found that it was absent. In consequence he gave her a hypodermic injection of strychnine, after which she rallied slowly. It was untrue to say that after the child was delivered he made preparation for departure. After the woman had rallied, both the nurse and himself placed a hand over the abdomen of the patient to see if the uterus was contracting, but, to their surprise, they neither of them were able to find it. The nurse then brought to him the bowl in which the afterbirth had been put, and he then looked at it carefully and to his surprise found the uterus also. He realized that when he had extracted the afterbirth the uterus had come away with it. The patient was in a collapsed state and quite unfit to be removed, though he knew that an operation would be necessary to save her life, and that the operation should be performed as soon as possible. He looked at the patient, but came to the conclusion that she would never be in a fit state to survive the operation, and he had to decide immediately what was the best course to adopt. He did not wish to shock the relatives, and, consequently, he told the nurse to say nothing to them about the fact that the uterus had come away. The nurse wrapped it up and he took it away with him to his surgery. He gave instructions to the woman's husband not to move the woman, being of opinion that any movement would be fatal and would start haemorrhage. On his arrival home he showed the uterus to his partner, Dr. Carroll. Twice a day afterwards he visited the patient and never was she well enough to stand an operation. It was because the husband said the family were all worn out that he ordered her removal to hospital on July 28th.

In reply to Mr. Roome, Dr. Bateman said that had the woman died he would have given a death certificate.

And no one would have heard of the matter?—Probably not.

That is what you wanted, I suggest?—That is not a fair question. I did not want anything hid. I probably should have consulted another medical man as to the procedure I should have taken.

In the course of his summing up the judge said that a jury should only convict a doctor of causing death by negligence if he did something which no ordinary skilful doctor should have done.

The jury were in retirement over an hour before giving their verdict.

Mr. Justice Shearman, in sentencing the accused, said he appreciated what a crushing blow to a professional man the mere conviction must be.

The propriety of appealing is, we are informed, under consideration.

# Universities and Colleges.

## UNIVERSITY OF OXFORD.

THE following candidates have passed the Final Examination for the degrees of B.M., B.Ch. in the subjects named:

*Materia Medica and Pharmacology:* D. A. Abernethy, F. J. Bach, A. V. Clemmey, C. R. Croft, T. L. Davies, J. H. Ferguson, E. L. Fothergill, W. H. Hudson, T. M. Ling, D. Lurie, S. Segal, C. W. Simpson, A. G. Wilson, E. M. Wright; Grace Batten, Rosalind V. Carruthers, Margaret A. L. Herbertson, Olive H. Lister, Irene M. Titcomb. *Pathology:* D. A. Abernethy, F. J. Bach, R. H. B. Bettington, W. B. Boone, C. Charleson, J. C. K. Chilcott, J. L. Cox, G. H. Crisp, C. R. Croft, J. A. Eyres, C. W. Fleming, J. N. C. Ford, A. T. Fripp, K. A. Hamilton, S. Harris, H. O. Hopkins, S. Howard, J. S. Jerome, T. M. Ling, C. W. Mackenzie, R. G. Mathews, E. L. Newell, W. F. Howson Ray, F. J. Sale, J. W. de W. G. Thornton, G. P. Thorold, O. R. Tisdall, E. C. Whitehall-Cooke, A. L. Wilkinson, D. O. Williams; Alice D. K. Peters. *Forensic Medicine and Public Health:* C. E. G. Beveridge, C. P. Blacker, H. A. Byworth, T. A. J. M. Dodd, A. T. Fripp, H. E. Harding, J. S. Jerome, M. J. W. Minahull, E. L. Newell, J. de la M. Savage, H. N. Stokoe, R. A. Walsh, D. O. Williams; Mathilde E. F. Bugnion, Ella J. Cockram. *Medicine, Surgery, Midwifery:* M. McC. Baird, R. J. Brocklehurst, T. A. J. M. Dodd, H. E. Harding, J. R. B. Hern, T. B. Hodgson, P. H. Martin, J. D. Mills, M. J. W. Minshull, A. W. L. Row, H. N. Stokoe, B. E. Tompson; Mathilde E. F. Bugnion.

## UNIVERSITY OF LEEDS.

AT a congregation held on December 13th the following degrees were conferred by the new Vice-Chancellor, Dr. J. B. Baillie:

M.D.—G. F. Walker (with distinction), Ella M. Hickman.

M.B., Ch.B.—*Marjorie E. Knowles, †Desirée M. B. Gross, †S. K. Sledge, C. H. Ackroyd, E. E. Blomfield, Kathleen Boddy, G. Chambers, Florence Cusworth, G. K. Fitton, H. Hartley, H. A. Hellewell, E. H. Lodge, W. Murphy, S. Nagley, R. S. Pyrah, G. D. Rai, G. Rosemont, E. T. Ruston, Ann Sugden, K. A. Turner.

* With first-class honours. † With second-class honours.

The William Hey Gold Medal for 1923 for the most distinguished graduate of the year was presented to G. F. Walker, who graduated M.B., Ch.B. with first-class honours in that year.

The William Hey Gold Medal for 1924 and the West Riding Panel Practitioners' Prize in Medicine have been awarded to Marjorie Elaine Knowles.

At the close of the ceremony the Vice-Chancellor, who was warmly received by the students and those members of the general public who were present, gave a short address to the graduates. In doing so he said he thought he might be departing from precedent. His brief address, however, was so charming and so full of wisdom that everyone felt that a much greater breach of custom would have been amply justified.

## VICTORIA UNIVERSITY OF MANCHESTER.

THE Council has accepted with regret the resignation of Dr. W. H. Wood, lecturer in anatomy and tutor to the Faculty of Medicine, on his appointment to the Derby Chair of Anatomy in the University of Liverpool.

Drs. A. E. Barclay, B. A. McSwiney, and B. J. Ryrie have been elected members of the Board of the Medical Faculty.

## ROYAL COLLEGE OF SURGEONS OF ENGLAND.

AN ordinary Council meeting was held on December 11th, when the President, Sir John Bland-Sutton, was in the chair.

*Fellowship.*

The Court of Examiners reported that at the recent examinations for the Fellowship 105 candidates presented themselves, of whom twenty-seven were approved, including three (M. A. Lautre, D. Levi, and C. Sturton) who had not yet complied with the regulations. Diplomas were granted to the following successful candidates as well as to Mr. Arthur J. Gardham, who had now attained the required age of 25 years:

Arthur Rocyn Jones, Anthony Blackstock, Angus Hedley Whyte, Frederick Cecil Wray Capps, Bernard Warren Williams, John Taylor Blackburn, Harilas Jamnadas Bhatia, Alexander Ernest Roche, Frederick William Widgery, Norman Leslie Capener, Daryll Cedric Corry, David Howard Patey, Bhagwant Sing Nat, William Stewart Duke Elder, John Dresdon, Charles James Officer Brown, Edwin Thomas Cato, Charles Mills Greenslade, Raymond Valentine Hennessy, Alan Edward Lee, George Dixon Fisher McFadden, Charles Harwood Osborn, Michael Joseph Smyth, Hubert Wallace Symons.

*Membership.*

Diplomas of Membership were granted to the following:

Margaret I. B. Cowling, Mary H. Elmitt, and C. J. Polson.

Licences in Dental Surgery were granted to ninety-eight candidates.

A report from the Board of Examiners in Dental Surgery was approved and adopted—that the regulations be modified so as to provide that a student who fails in any subject of the examination must produce a certificate that he has been "working in a dental school to the satisfaction of the dean for a further period of three months."

Tuft's College Dental School, Boston, Mass., U.S.A., was added to the list of institutions whose degree of D.D.S. is accepted as exempting a candidate from the preliminary science examination and as admitting him to the first and second professional examinations on production of the certificates of study required by the regulations of the College.

A report on the proceedings at the annual meeting of Fellows and Members was received.

Mr. H. S. Pendlebury was re-elected a member of the Court of Examiners.

## ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

AT the annual meeting of the Royal College of Physicians held on December 4th, Dr. George Lovell Gulland, C.M.G., was re-elected President for the ensuing year. The other office-bearers were re-elected also.

# Obituary.

## JOHN IRVINE HUNTER, M.D.,

Professor of Anatomy in the University of Sydney, N.S.W.

THE death of the youthful professor of anatomy in the University of Sydney has inflicted upon medical science a loss the gravity of which it would be difficult to exaggerate. He was opening up new fields of investigation and suggesting new lines of advance which were certain to lead to results the extent and importance of which no one can estimate.

John Irvine Hunter was born at Bendigo in Victoria in 1898. When 8 years of age he developed pneumonia, and after his convalescence he was sent to recuperate at Albury, across the border in New South Wales. The aunt with whom he stayed at Albury decided to keep him there; hence his career was spent in the mother state of Australia. The bursary system of the Education Department in New South Wales made it possible for him to work his way from the State School at Albury to the Fort Street High School in Sydney (1912-14), and ultimately enabled him to enter upon the study of medicine at the University of Sydney in March, 1915. For several months after leaving school he passed through a phase of great anxiety. Without the means to enter the University, and being uncertain of securing a scholarship or bursary, he entered a business house in Sydney as an errand boy. But after six weeks of this experience he succeeded in winning a State bursary, which helped to defray the cost of his first year at the University. His most intimate friend during these years states that "his school course was undistinguished save for keen application, but even then he was recognized as a man of more than ordinary qualities." During his first year at Sydney University, without enough to get adequate food or time to spare for sport, he was also embarrassed by many other private difficulties. But the next two years gradually revealed the emergence of his distinctive abilities. He was earning an easy competence as a successful coach—usually in subjects one year ahead of the studies for his own examinations—and was winning scholarships and prizes. But besides having to earn the money for his own education he had to help to support his mother, who had made such great sacrifices for him during the first seven years of his life.

PROFESSOR J. I. HUNTER, M.D.

It was in 1917, when, after a life of singular difficulty and anxiety, he for the first time could contemplate the possibility of attaining the object of his ambitions, he conceived it to be his duty to run the risk of sacrificing everything. The Ministry of Defence had announced that medical students were expected to continue their studies and not go on military service. The Dean of the Faculty of Medicine was believed to favour the view that it was a mistake to deny medical students the opportunity of service open to other loyal men. The issue became a burning question in the University. Hunter decided that it was his duty to enter the army; but not wishing to embarrass those of his fellow students who had acted upon the Minister's instructions, he waited until the vacation and then, without telling anyone, he went off and enlisted in the ranks. He went into a military camp and completed his training, and paid farewell visits to his relatives and intimate friends. On returning to the barracks he was amazed to find, instead of sailing orders for France and Belgium, an official notice ordering him to return to his studies. It is supposed that the dean of the medical school informed the Ministry of Defence that Hunter was a man of quite exceptional ability, who must at all costs be retained for the good of the medical school. Hunter's own hardships had developed in him an intense sympathy with the difficulties of others, and at one stage of his student career he even thought of abandoning the profession of medicine, for admission to which he had had to overcome such tremendous difficulties, and take up social service. Fortunately he consulted a very wise man, the Bishop of Albury, who had encouraged him in his early struggles, and now advised Hunter to stick to medicine, as it afforded him a much wider scope for real social service than any lay position could give. Toward the end of his medical course he was again in doubt as to whether he should adopt the clinical or the academic mode of life, both of which keenly interested him. Professor J. T. Wilson, to whom he submitted his difficulties, urged him to adopt the work of a teacher and investigator, for which he had such exceptional aptitude.

During the last two years of his course he served as a demonstrator of anatomy and displayed a very keen interest in neurology, especially in the sympathetic system, which was destined to be the field of his greatest achievement. While yet an undergraduate he wrote an essay (awarded the Sandes Prize in Surgery) which he called "An Interpretation of Abdominal Pain," using clinical evidence collected by himself as the material for a penetrating and original analysis. When he graduated (with first-class honours and the University medal) in March, 1920, he was at once appointed senior demonstrator of anatomy. But Professor Wilson, realizing that, though there were urgent reasons why Hunter should immediately assume the responsibility for teaching anatomy, some experience of clinical medicine and surgery is of vital importance to an anatomist, arranged with the hospital authorities to let Hunter act as a resident in the Royal Prince Alfred Hospital during vacations.

A couple of months after Hunter's graduation Professor Wilson was appointed to the chair of anatomy at Cambridge; and in July, 1920, Hunter became associate professor of anatomy at the age of 23 years. Before Professor Wilson left Australia at the end of the year he persuaded the University of Sydney to put the youthful professor in charge of the department of anatomy, and to agree to give him the opportunity to widen his experience by visiting medical schools in Europe and America. Hence, in August, 1920, he set out for England and he returned via America to Australia in February, 1922. Before he left Australia the burden of his heavy responsibility seems to have sat lightly on his shoulders, for in addition to the task of teaching and learning to administer a great department, he accomplished three important researches in utterly different fields of embryology, anthropology, and physiology.

He cleared up many of the difficulties in the interpretation of ovarian pregnancy, in the real significance of the occurrence of Neanderthaloid characters in aboriginal Australians, and in analysing the complicated factors of spinal shock following transverse section of the spinal cord. The first of these three noteworthy memoirs was published in the *Journal of Anatomy* in January, 1922. The special value of the case of primary ovarian pregnancy was due to the early period of development and the clearness of the evidence in demonstration of the fact that the ovum was fertilized as the closing coagulum was formed in the mouth of the Graafian follicle and proceeded to develop in the connective tissue in this situation, embedding itself *ab initio* outside the growing corpus luteum of pregnancy. The lucidity of the account of this specimen and the interpretation of its complexities afforded the first indication to the anatomical world at large that a new John Hunter had arisen.

The results of the experimental work that he carried out in collaboration with Mr. N. D. Royle between October, 1920, and July, 1921, were not published until this year ("The symptomatology of complete transverse lesions of the spinal cord," *Australian Journal of Experimental Biology and Medical Science*, vol. i, 1924, p. 57). By means of an ingeniously devised series of experiments he courageously attacked a difficult problem which had taxed the skill of many of the best experimental physiologists and clinical observers of Europe and America. In particular he addressed himself to the task of deciding whether or not vascular disturbances played a part in determining spinal shock. He showed that the variations in the ultimate results after section of the cord cannot be wholly explained by release of function alone. There may be combined with release of function (due to section of the conducting pathways), vascular changes leading to rapid degeneration, or a temporary stage of hyperexcitability of the nerve cells. The experience gained in this preliminary investigation was destined to prove of far-reaching importance when, in 1922, Hunter and Royle embarked upon the still more difficult task of cutting the Gordian knot of controversy regarding the sympathetic innervation of striated muscle and the central control of muscular tone. But before undertaking this work Hunter spent eighteen months in Great Britain, Europe, America, and New Zealand, getting into touch with the medical schools of the world. He went first to his former master, Professor Wilson, in Cambridge, who magnanimously allowed us at University College, London, to have the privilege of Hunter's stimulating help for a whole year. During that time he occupied the position of an honorary lecturer; and he taught and carried on research, gave addresses to various societies, studied clinical methods (especially neurology) in London, as well as in France, Holland, and Germany, and visited and made himself familiar with the methods of anatomical departments in most of the British and many of the Continental schools.

He carried out an important research upon the oculomotor nucleus of Tarsius (*Brain*, 1923), which, taken in combination with the results obtained by Brouwer, sheds important light upon the problems of human evolution. He made an intensive study of the fossil remains of men, and devoted particular attention to the Piltdown and Rhodesian remains in the British Museum. He devoted much time and energy to the problems involved in the reconstruction of the Piltdown skull, and showed that when the occipital region is properly reconstituted and orientated it presents a much closer analogy to the condition found in the newborn African anthropoids than does any other human skull. By demonstrating that there is no disharmony between skull and jaw he has eliminated the chief factor in the controversy that had been raging for ten years before his work was done. His monograph on the Piltdown problem, written in 1922, has not yet been published.

During the short time he spent with Dr. Ariens Kappers in Amsterdam he completed an investigation on the forebrain of apteryx (*Koninklijke Akademie van Wetenschappen te Amsterdam*, 1924), for which he was awarded the M.D. degree of the University of Sydney and the University medal. On his way back to Australia he spent nearly three months visiting American and Canadian medical schools, and not only acquired a knowledge of the scientific workers and their methods, but also rendered a great service by expounding in lectures and demonstrations the meaning of recent anatomical and neurological work in England. In particular he did a great deal toward making Dr. Henry Head's work on aphasia understood. On his return to Australia he was made full professor of anatomy, being given the Challis Chair which Professor Wilson had formerly occupied; and he set to work to introduce the far-reaching changes incidental to the restoration of histology to the department of anatomy. With the experience gained in his pilgrimage abroad he came to exercise an influence in the medical school and University; he was worshipped by the students and trusted implicitly by his colleagues.

But the heavy work which these things involved did not prevent him from embarking upon a new and most formidable task—the experimental investigation of the problems of muscular tone, the solution of which had hitherto defied the leading physiologists and neurologists. He attacked this intricate conundrum with confidence and courage. His experimental work upon the effects of section of the spinal cord gave him technical experience and practice in observing the effects of lesions of the nervous system; his association with Professor Kulchitsky at University College had given him an exact and certain knowledge of new facts relating to the sympathetic innervation of striated muscle which were of fundamental importance in the attempt to solve his problem; and his experience of the work at Queen Square, the researches of Dr. Henry Head, and Professor Stopford's work in Manchester, strengthened his assurance boldly to attack the problem. He had explored the field of neurology and acquired the wider vision; he had acquired the experience of solving his own problems and of seeing other people solve theirs; he was ready to defy armchair critics and boldly to attempt the solution of the enigma of muscle tone.

For several years Mr. Royle had been endeavouring to devise some means of alleviating spastic paraplegia. He had tried the usual surgical procedures on human patients, and by experiments on animals tried to discover some new operation, without much success. He put his difficulties before Hunter on the latter's return to Australia. Hunter showed him some of Kulchitsky's histological preparations, which revealed quite clearly that, contrary to the opinion expressed by Boeke and Aghdur, the sympathetic fibres to striated muscle did not go to the same muscle fibres as the medullated nerves. He suggested that they should cut the sympathetic supply to an animal's limb and study the result. They discovered that section of the sympathetic did not destroy tone, nor even necessarily reduce it. The change in tone was qualitative rather than quantitative. That aspect of tone which Sherrington calls "plastic" is the function of those muscle fibres innervated by the sympathetic; whereas "contractile tone" (as Langelaan has called it) is a function of the voluntary and contractile fibres innervated by medullated somatic nerves, and is, therefore, not diminished by section of the sympathetic nerves. This fact is the principle that underlies the surgical operation which Hunter suggested (and of which he devised the technique) for the alleviation of those cases of spastic paraplegia due to an excess of plastic tone, but *not* for those in which the contractile tone alone is responsible for the spastic condition. In the hands of Royle this operation has yielded results which must seem incredible to those who have not witnessed them. It has placed in the hands of the surgeon a technique which is destined to relieve a considerable group of sufferers from spastic troubles not only of voluntary muscles, but also of visceral muscles, such as those of the stomach and intestine, the bladder, etc. But Hunter has extended the field of his experimental investigations and has studied the nature of the proprioceptive reflex arcs that are concerned with the maintenance of the two varieties of tone. Deiters's nucleus and the vestibulospinal tract form integral parts of the somatic arc regulating contractile tone; whereas the ponto-spinal tract (Collier and Farquhar Buzzard) is an essential part of the sympathetic proprioceptive arc regulating plastic tone. His investigations have also shed a new light upon the role of the frontal cortex, the corpus striatum, the red nucleus, the substantia nigra, and the cerebellum as influences affecting tone.

Hunter and Royle were invited to New York to deliver (October 20th) the John B. Murphy Oration on their work (see *Medicine, Surgery and Gynecology*, December, 1924), and they gave demonstrations in many of the great medical centres of the United States and Canada. Hunter then came to England to expound the results of his work and to meet those who criticize his results. By a tragic fate he was struck down in the very week when he had hoped to demonstrate to those best qualified to appreciate it the new vision of neuro-muscular function created by his genius and insight. He died on December 10th, at University College Hospital, of enteric fever contracted before his arrival in England. He was so absorbed in the mission that had brought him to England as to be unconscious of the gravity of the illness from which he was suffering. The last lecture he gave was delivered on December 5th, in the anatomy theatre in Cambridge, the department of the master who had played so large a part in guiding his life and shaping his aims.

To those who have come under the spell of his genius and learned the truth of the teaching for which he has given his life it must ever remain a duty and privilege to expound his work in the hope of convincing others of its truth and to extend its applications by experiment and clinical application. To his widow and the University of Sydney we extend our deepest sympathy on their irreparable loss.

G. E. S.

The funeral service was held on December 12th at St. Pancras Church. The large congregation included, besides the widow, Sir Arthur Keith, the Provost and the Secretary of University College, Professors J. T. Wilson, G. Elliot Smith, J. P. Hill, E. H. Starling, A. J. Clark, C. C. Choyce, T. R. Elliott, D. M. S. Watson, and Kulchitsky, Mr. T. P. Dunhill, the High Commissioner for Australia, and the Agent-General for New South Wales. The British Medical Association was represented by Dr. Alfred Cox, Medical Secretary.

## The Services.

### NO. 14 STATIONARY HOSPITAL.

THE annual dinner of the 14th Stationary Hospital was held at the Trocadero Restaurant, London, on December 12th. Lieut.-Colonel J. R. Harper, C.B.E., took the chair, and proposed the toast of "The Hospital," to which Colonel J. S. Warrack responded. It is proposed to hold the next dinner on the second Friday in December, 1925.

## Medical News.

DR. CHARLES MAYO will be the president of the Inter-State Post-Graduate Assembly which is to visit this country next June, and not his brother, Dr. William Mayo, as originally arranged. Other members of the party will be Dr. Franklin H. Martin, Director-General of the American College of Surgeons, Dr. Crile, and Dr. John B. Deaver. Writing to Mr. Philip Franklin, Dr. Mayo states that it will certainly be a big meeting and expresses the hope that it will do a great deal of good in promoting harmony between the medical professions of Great Britain and America, and that its influence will be far-reaching on the people who read and hear of it.

OWING to the illness of Dr. Chandler, the meeting of the Tuberculosis Society on December 19th was cancelled. At the next meeting, on January 16th, 1925, Dr. Anthony Feiling will speak on tuberculosis of the central nervous system.

GUY'S HOSPITAL was founded at the sole costs and charges of Thomas Guy on January 6th, 1725. In connexion with the bi-centenary a solemn service in commemoration of the founder and other benefactors of the hospital will be held in the Cathedral Church of St. Saviour, Southwark, on Tuesday, January 6th, 1925, at 12 noon. The Prince of Wales, president of the hospital, has signified his intention to be present.

THE Queen's University [Belfast] Club, London, will hold a dance in the Hotel Cecil on Thursday, January 15th, 1925, at 9 p.m. Price of tickets (to include buffet-supper): members 12s. 6d., members' guests—ladies 10s. 6d., men 11s. 6d. Application for tickets to be accompanied by remittance and addressed to the Honorary Treasurer, 17, Wimpole Street, W.1.

THE Fellowship of Medicine is arranging a series of general lectures at the Royal Society of Medicine, the first of which will be delivered by Sir Arbuthnot Lane, at 5.30 p.m. on January 20th, 1925, and deal with the treatment of fractures. Beginning on January 12th the London Temperance Hospital, in association with certain special hospitals, will hold a two weeks' intensive course in the general and special departments of medicine and surgery. A course in cardiology has been arranged from January 12th to 23rd at the National Hospital for Diseases of the Heart (attendance limited to 16). The Royal Eye Hospital, Southwark, will hold a fortnight's course in ophthalmology from January 5th, and from January 5th to 31st there will be a course in the diagnosis and treatment of common diseases of the nervous system at the West End Hospital for Nervous Diseases. From January 6th to 31st Dr. Porter Phillips and Dr. Thomas Beaton will give a series of lecture demonstrations on psychological medicine at the Bethlem Royal Hospital. A course in urology will be held at St. Peter's Hospital from January 12th to February 7th. Copies of the syllabus of these courses may be obtained from the secretary to the Fellowship of Medicine, 1, Wimpole Street, W.1.

THE January class of instruction in fevers, under the Metropolitan Asylums Board, will be held on Mondays and Thursdays at the Eastern Hospital, North-Eastern Hospital, and Grove Hospital, on Tuesdays and Thursdays at the North-Western Hospital, on Tuesdays and Fridays at the Western Hospital and the South-Western Hospital, and on Wednesdays and Fridays at the Park Hospital. The special course of instruction on the diagnosis and treatment of fevers will be held at the South-Eastern Hospital in February and March, on Tuesdays and Fridays, at 11 a.m., commencing February 3rd. A three months' course of lectures and demonstrations in hospital administration will be given at the North-Western Hospital on Mondays, Thursdays, and alternate Saturdays, beginning on January 5th. Full particulars may be obtained from the Clerk to the Metropolitan Asylums Board, Victoria Embankment, E.C.4.

THE annual dinner of the Old Epsomian Club was held at the Trocadero Restaurant, London, on December 11th, with the President, Mr. G. E. Waugh, F.R.C.S., in the chair. Proposing the toast "Floreat Epsomia" in an interesting and witty speech, Mr. Waugh remarked that Epsom College was founded originally by a man of great individuality, who had taken an original line from the first in such matters as the teaching of natural science, and to-day it was proud of the fact that its scholars developed pronounced individualities rather than passively conforming to type. Individuality was also the characteristic of the teaching staff, and this quality was of great value in the world to-day. The headmaster, Mr. A. C. Powell, responding to the toast, announced some striking successes attained in the intellectual sphere during the past year. The new nave of the chapel—an Old Epsomian war memorial—was now in full use. The cost of erection was £12,000, of which over £10,000 had already been raised; he appealed to Epsomians to make a special effort to raise the remaining sum required. He hoped that it might soon be possible for more Old Epsomians to be elected to the Council. The college was the school of the medical profession, and had done a great work in training medical practitioners. Besides fifty boys, the sons of doctors, educated year by year without charge, a sum of no less than £5,000 had been awarded last July by the school in the form of scholarships, etc. The toast of "The Guests" was proposed by Mr. S. Maynard Smith, C.B., F.R.C.S. The Right Hon. Sir Hamar Greenwood, Bt., K.C., M.P., in his reply, described the medical profession as the highest instrument for good the world had ever seen: it recognized no frontiers of creed, colour, or race. Quality rather than quantity was the most vital need for the future welfare of the British Empire, and, therefore, he was particularly glad to be present that night and to extend to the college his congratulations on its past and his warmest wishes for its future. During the evening the school song, "*Canticum Epsomiense*," was sung enthusiastically.

THE annual dinner of the British Dental Hospital (formerly British Dentists' Hospital) was held at the Langham Hotel on December 6th, the President (Sir Harry Baldwin) in the chair. Dr. Lennane, in proposing the toast of the hospital, said that it had now proved the value of its existence. Mr. George Thomson, in his reply, said that all the members of the staff were also members of the British Dental Association. Mr. E. E. Turner proposed the health of the guests, which was replied to by Drs. Fenton, Dudfield, Hewat, and Caley, and Mr. C. E. Wallis.

THE Minister of Health (the Right Hon. Neville Chamberlain, M.P.) has appointed Captain William Brass, M.P., to be his parliamentary private secretary (unpaid).

THE Rockefeller Institute for Medical Research has announced the release of the drug known as tryparsamide for use in the treatment of human and animal trypanosomiasis (African sleeping sickness and mal de Caderas) and selected cases of syphilis of the central nervous system. This action is based on results reported from clinical investigations which have been in progress for several years. The

drug will be manufactured by the Powers-Weightman-Rosengarten Co. of Philadelphia, and will become available through the regular trade channels about January 1st, 1925. In releasing the drug for the benefit of the public, the Rockefeller Institute desires it to be known that the Institute does not share in any way in profits that may be derived from the sale of the drug, and that, with the cordial co-operation of the manufacturers, provision has been made for the maintenance of a schedule of prices on as low a basis as possible.

THE annual report for 1923–24 of Livingstone College, Leyton, draws attention to the fact that it is now thirty-two years since the College was founded to give medical instruction to candidates for the mission field. During that time 810 students have entered for the full course or for part of it, of whom 540 are still actively engaged abroad. During the past session the thirty-five students represented no fewer than twenty-three different missionary societies and eight nationalities. The vacation course in July was attended by twenty-four students, representing nine missionary societies; and forty-seven students have attended short courses on the care of the health in the tropics. The financial report shows that all expenditure during the past year has been met and the existing deficit reduced by £42. A report of the commemoration day proceedings in May was published in our columns of June 7th (p. 1035).

THE fees of district medical officers under the London County Council are to remain for a further period until December 31st, 1925, at the present rate of 11s. 6d. a year for each person entitled to free medical attendance, the sum to include medicines and simple surgical dressings.

BY an Order of Privy Council, dated December 13th, the Earl of Balfour, K.G., O.M., F.R.S., and the Right Hon. William Graham, LL.B., M.P., have been appointed into the vacancies in the membership of the Medical Research Council caused by the retirement of the Right Hon. Edward Wood, M.P., and Mr. A. G. Church, D.S.O., M.C. Lord Balfour has accepted the chairmanship of the Medical Research Council.

# Letters, Notes, and Answers.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.* Authors desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Financial Secretary and Business Manager, 429, Strand, W.C.2, on receipt of proof.

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—not necessarily for publication.

ALL communications with reference to advertisements as well as orders for copies of the JOURNAL should be addressed to the Financial Secretary and Business Manager, 429, Strand, London, W.C.2. Attention to this request will avoid delay. Communications with reference to editorial business should be addressed to the Editor, BRITISH MEDICAL JOURNAL, 429, Strand, W.C.2.

*Communications intended for the current issue should be posted so as to arrive by the first post on Monday or at latest be received not later than Tuesday morning.*

THE telephone number of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is Gerrard 2630 (Internal Exchange). The telegraphic addresses are:

EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London.*

FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London.*

MEDICAL SECRETARY, *Mediscera Westrand, London.*

The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone: 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone: 4361, Central).

## QUERIES AND ANSWERS.

### INCOME TAX.

*Sale of a Share in Practice.*

"D. C. H." took over his former partner's share in the practice, the consideration given to be payment for four years of 20 per cent. of the panel receipts less certain expenses, the payments being made quarterly. How do they affect his income tax liability?

*** Our correspondent must decide on all the facts—including the negotiations preceding the sale—whether (*a*) the share in the practice was sold for an undetermined sum equal to the total of the payments to be made, or (*b*) for a four years' annuity based on the 20 per cent. The latter case is a rare one, the normal transaction being essentially one of payment of a capital sum by instalments. In neither case can the payments be deducted as professional expenses, but in the latter case the amount of the payments will have to be charged at the full rate of tax (without allowance for earned income), because that tax can be deducted by "D. C. H." when making the payments—but not afterwards.

*Cash Basis: Retirement.*

"A. W." refers to a reply given to his inquiry in our issue of November 15th last, and says that the local inspector refuses to accept his contention that post-retirement cash receipts are not assessable on the retired practitioner.

*** Our correspondent may find it useful to refer to replies in recent issues as follows: to "L. B. C.," September 13th; to "Leeds," September 20th; and to "D. L.," October 11th. Putting the matter in a phrase, the inspector has not given due weight to the fact that the amounts of the cash receipts were taken as measures of the true income of the practice, and to the further consideration that a change of personnel in the practice does not justify a departure from the normal course of procedure. When, for instance, "A. W." paid tax on the average of his net receipts for 1919, 1920, and 1921, he was not paying tax on that specific income but on the income of the financial year ended April 5th, 1923. It is admitted that exceptional circumstances may from time to time justify a departure from the cash basis rule, but retirement is not, in our opinion, a fact which bears on the question. Failing agreement with the inspector, "A. W." might very well appeal either to the general (that is, local) commissioners, or to the special commissioners on circuit.

### SENSIBILITY TO HORSE SERUM.

"F.R.C.S.E." writes: I am in the unfortunate position of being sensitive to horse serum, usually getting a more or less severe local or general urticaria after a serum or vaccine injection. I recently had an anticatarrhal injection, with the usual discomfort. I intend to have some other injections later, and would welcome any suggestions for the prevention of the unpleasant after-effects.

## LETTERS, NOTES, ETC.

As in former years, the Automobile Association announces that its road patrols will not be on the roads on Christmas Day.

### KELOID VACCINATION SCARS.

DR. F. W. STANSFIELD (Public Vaccinator, Reading) writes: During many years of public vaccination I have seen probably ten or a dozen cases similar to that described by Dr. J. Crisp in the JOURNAL of December 6th (p. 1086). The condition, in my experience, never arises except when the vesicles become broken, and is probably a slight and localized "coccic" infection. My cases have all been treated alike and all successfully. The scars are dressed with ung. resorcin co. spread upon sterilized gauze, the dressings being changed every alternate day. After a few days the keloid breaks down, leaving an open ulcer. The treatment is continued with the same ointment, and in a week or so the ulcer heals, leaving a normal healthy vaccination scar. As there are many brands of resorcin ointment on the market, I may say that the one I use is made by Messrs. James Woolley and Sons of Manchester.

### "EPHEMERIS PHARMACOLOGICA."

MESSRS. OPPENHEIMER (179, Queen Victoria Street, London, E.C.4) apparently are not with those who would abolish Greek from the educational curriculum. Even if the Greek be somewhat late, *Ephemeris Pharmacologica* is not unpleasant as a variant of "Medical Visiting List with Therapeutic Notes." The little book for 1925 which Messrs. Oppenheimer offer to the medical profession is full of information; and in compiling it the authors have given heed to the appeal of Crabbe:

> Oh! rather give me commentators plain,
> Who with no deep researches vex the brain.

The visiting list is arranged for recording the visits against any particular name for a month. The therapeutic notes are brief but to the point, and appear to cover most of the drugs used in modern medicine. Concise information is given on some legal matters, diet, infectious diseases, and poisons and their antidotes. There are height and weight tables, a posological table, tables for converting the metric system, postal information, and an almanac. It is a handy book of quite small dimensions.

### CORRECTION.

OUR report (p. 1113) of the meeting of the Surgical Section of the Royal Society of Medicine held on December 3rd should have stated that the chair was taken by the President, Mr. Herbert Paterson.

### VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 36, 37, 39, and 40 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 38 and 39.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 228.